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AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

Vol. XLIII
Number 19

PUBLISHED WEEKLY AT 239 WEST 39th STREET
NEW YORK, NOVEMBER 4, 1920

Thirty-five cents a copy
Three dollars a year

COTTA TRUCK TRANSMISSIONS

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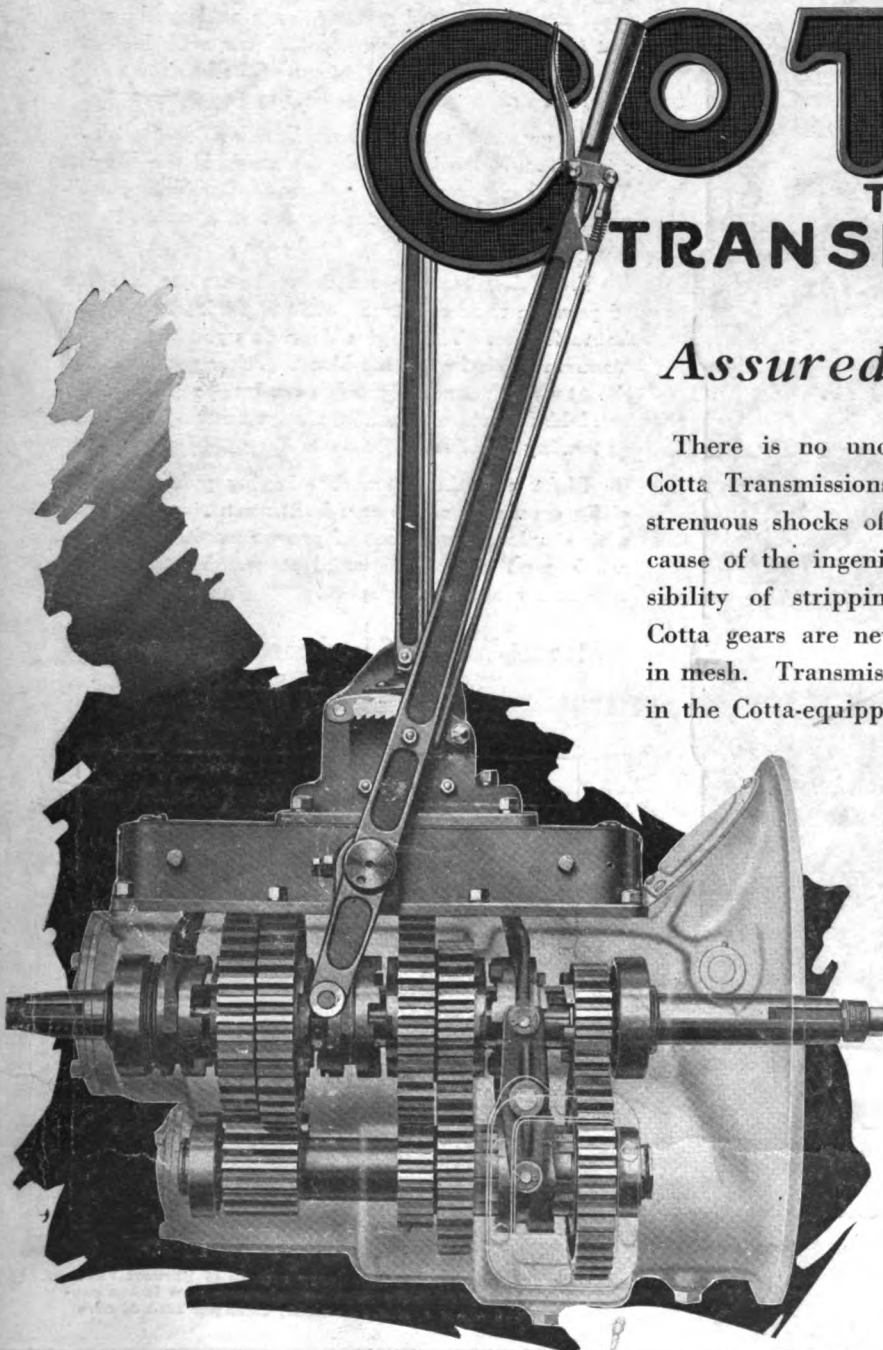
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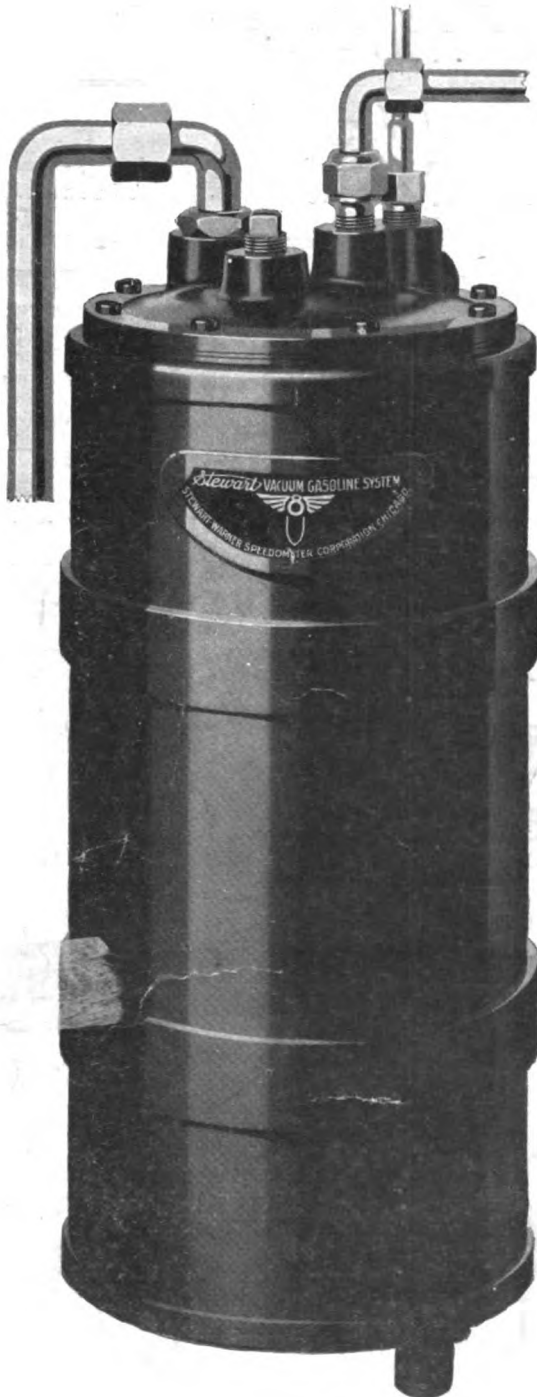
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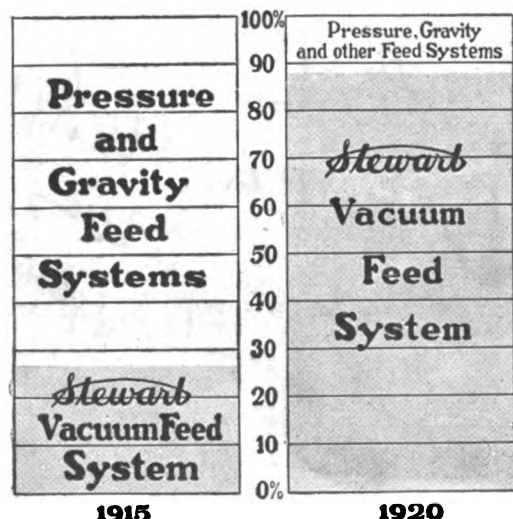


Diagram illustrates extraordinary growth of Stewart Vacuum System as standard equipment, showing how it has supplanted other systems on eighty-eight per cent of cars

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ASTOR, LENOX AND
TILDEN FOUNDATIONS

No. 19

VOL. XLIII

NEW YORK—THURSDAY, NOVEMBER 4, 1920

Gear Makers Hear Much Discussion of Standards

With the ultimate view of reducing the manufacturing cost of gears, and of simplifying the difficulties of replacement, the A. G. M. A. is studying carefully all phases of standardization and this subject becomes prominent in report of the recent meeting.

By P. M. Heldt

A THREE-DAY semi-annual meeting of the American Gear Manufacturers' Association was held at Lake Mohonk Mountain House, Ulster County, New York, on Wednesday, Thursday and Friday of last week. While the attendance was not as large as at some of the previous meetings, a goodly proportion of the membership was represented, and there were also many ladies present.

On the first day, Oct. 27, the sub-committees of the Standards Committee held meetings in the morning, while during the afternoon what may be called a business session was held. At this meeting reports were received from officers and from chairmen of the different committees, and two addresses were made, one by Dr. P. G. Agnew, secretary of the American Engineering Standards Committee, and the other by Calvin W. Rice, secretary of the American Society of Mechanical Engineers. Thursday was Standards Day, both sessions being devoted to reports of the sub-committees of the Standards Committee and to discussions thereof. The session on Friday was devoted to commercial topics, the chief paper of the session being one on the "Machine Rate Method of Distributing Expense," by Christopher Haigh, Supervisor of Costs

of the General Electric Co. A report of the Committee on Uniform Cost Accounting was made by the chairman, J. H. Dunn, and a report by the Commercial Standardization Committee was made by E. J. Frost.

At the opening of the first general meeting, Chairman F. W. Sinram made a brief address in which he referred to the seriousness of the times, stating that one branch of the industry was at present in a precarious condition. The reading of the minutes was dispensed with, and after the roll call the Secretary's report was received, which among other things showed that the Association at present comprises 92 companies, which are represented by 112 executive and 59 associate members. After the report of the Secretary and the Treasurer had been accepted, President Sinram appointed a Resolutions Committee composed of R. P. Johnson, W. H. Diefendorf, and S. L. Nicholson, and a Credentials Committee composed of F. D. Hamlin, J. C. McQuiston and C. F. Goedke. Two new company members have recently been admitted, the Diamond Chain & Mfg. Co. and the Diamond State Fibre Co.

Dr. Agnew spoke on "Standardization from the

Point of View of the American Engineering Standards Committee." He outlined the growth of the national standardization movement and enumerated the countries in which National Standards Committees have been organized so far. The dean of the national standards committees is the British Engineering Standards Committee, which was organized as far back as 1902. The American organization has been in existence since 1918 but has been really active only since last year. The American Engineering Standards Committee will not itself formulate standards, but will coordinate the work of committees of the different industries. It will see to it that standards are arrived at in the proper way, and if so arrived at they will be given the endorsement of the committee and will become known as the American standards. One of the principles insisted upon by the American Engineering Standards Committee is that three interests must be represented in the formulation of a standard, namely, producer, consumer and outside interests, and none of these three can be in the majority in the committee except by consent of the other two.

The different associations which will directly formulate the standards will be known as sponsors, and the American Gear Manufacturers' Association and the American Society of Mechanical Engineers have been made joint sponsors for gear standards. The American Engineering Standards Committee has 40 members, these being appointed by 14 standardizing organizations and four Government departments. There will be sectional committees for all industries, and gear work has been assigned, as pointed out, to the American Society of Mechanical Engineers and the American Gear Manufacturers' Association. Dr. Agnew pointed out the rapid progress in standardization work that is being made in several European countries. The Swiss, German, Dutch and Swedish standardization committees are following the practice of dividing the mechanical industries into a very large number of small sections, which tends to facilitate and to expedite the work. Thus the German committee, which has been in existence less than two years, has already issued 160 standard leaflets and has 240 others well along toward completion.

A. S. M. E. Standardization Work

Calvin W. Rice, secretary of the A. S. M. E., spoke on "Standardization." The American Society of Mechanical Engineers is the oldest mechanical standardization body in this country, and the scope of its standardization work is very wide. Mr. Rice said that in standardization work there were three factors to be considered, namely, the method, the variety and the financial support necessary for carrying on the work. The method at present employed by the American Society of Mechanical Engineers is the result of 40 years' experience. In Great Britain the Government has appropriated a sum of \$5,000,000 for financing standardization work. This cannot be done in this country, and it here devolves upon the different industries to finance the work.

The American Society of Mechanical Engineers is particularly proud of its boiler code, upon which ten years were spent. This boiler code is now part of the laws of eighteen States. Other standards evolved by the A. S. M. E. are standards of graphic representation, pipe and pipe thread standards, standard abbreviations and punctuation, pipe flanges, a power test code, etc. Mr. Rice urged every head of a gear manufacturing concern present to let his technical employees serve on the standards committees of the A. G. M. A. Men of special attainment in the technical staff should be sent to the committee meetings.

In connection with the report of Chairman J. B. Foote

of the Labor Committee the association endorsed the principles laid down by the Industrial Relations Committee of the Philadelphia Chamber of Commerce, declaring for the open shop.

The Chairman of the Library Committee presented the plans of that committee for the A. G. M. A. Gear Book. He explained that this was not to be a text book, but a reference book containing charts, formulas and data that are useful to gear designers. It is planned to make this a 500 page book of 6 x 9 in. size. Among the materials which it is planned to incorporate in this volume are mathematical tables, strength of material, brief descriptions and illustrations of change gears of all kinds, descriptions of instruments for testing gears, tables of dimensions of gear tooth parts, etc. The committee asked for the opinion of the association as to the advisability of making the book either a loose-leaf or a permanently bound book and of including descriptions of machines for cutting gears. The question was discussed at a considerable length, but no definite action was taken, partly because it was realized that the compilation of the work and its publication in a manner creditable to the A. G. M. A. would involve a prodigious amount of work, as well as heavy expense.

Standardization Work of Electric Power Club

The meeting on Thursday morning opened with an address by C. L. Collens, II, president of the Reliance Electric & Engineering Co. and past president of the Electric Power Club, on "Industry Organization." Mr. Collens said that in the standardization work of the Electric Power Club they had at first gone at the matter in a haphazard way, but had found this very unsatisfactory, and they then analyzed the products which they wished to standardize.

One of the first things standardized by the Electric Power Club was methods of rating electrical apparatus. Among the factors which have to be taken into account in rating the performance of electrical apparatus are heating, overloading, allowance for voltage variation, etc. After the problem had been thoroughly analyzed, the progress was more rapid. It was also found necessary to distinguish between different classes of standards, and the Electric Power Club now has three such classes as follows: Adopted Standards, which every member is under a moral obligation to live up to; Recommended Practices and Standards for Future Design. Under each of these headings there are again three sub-divisions, namely, fixed dimensions, maximum limits and minimum limits. At first it was attempted to accomplish all of the work at the general meetings, any subject for standardization being introduced there and then generally discussed. It was found, however, that this was a very inefficient method, for as a rule only a small proportion of the attendance at a general meeting would be interested in a particular subject. Therefore, during the past two years, the Power Club has been divided up into sections, and sectional meetings are held between general meetings. Consequently, any material on proposed standards comes to the general meeting in completed form, the proposed standards being printed in full, and distributed to the membership at least thirty days previous to the meeting. In conclusion, Mr. Collens said that standardization did not mean standardization of the quality of the product, but merely a standard measure of size, and that an industry whose products are well standardized, can give better service, to its customers; standardization saves energy, conserves material and permits of quantity production.

As the products of an industry become standardized, the manufacturer hesitates more and more to accept orders for specialties, because of their relatively high cost

of production. Standardization tends toward lower prices and also toward stability of prices, because if the manufacturers are organized, they will compare costs and methods of calculating costs, and this will eliminate inordinate price boosting as well as ruinous price cutting.

Other activities at the Power Club include the formulation of a uniform cost accounting system, and work in connection with tariff legislation. The club recently sent committees to make investigations in Germany and Japan as to the amount of labor and material contained in the electrical products of these countries, and the information thus gained will be used in cooperating with the National Tariff Commission. Recently the Power Club also has gone into the subject of foreign trade, and has organized a special Foreign Trade Bureau which will be located in New York City. It will cooperate with the manufacturers and with the National Bureau of Foreign and Domestic Commerce.

Mr. Collens said that he has come more and more to the conclusion that in the industry organization we have the basic unit for national commercial organization. The U. S. Chamber of Commerce does not properly represent the industrial life of the country, and not even the National Association of Manufacturers can do so. There is a great advantage to the manufacturer in the opportunity to meet leading men in his industry, and he greatly values the direct contact with his competitors. One of the greatest obligations of an industry is to work out a proper code of ethics for that industry.

Spur Gear Committee Report

B. F. Waterman made a report for the Standards Committee, as a sectional committee of the American Engineering Standards Committee, and also a report of the General Standards Committee of the A. G. M. A. In this latter report he presented a review of the gear standardization work accomplished so far. Next, the various subcommittees presented their reports.

F. E. Eberhardt reported for the Spur Gear Committee, the report covering only industrial gearing. The subject of automotive spur gearing will be taken up by this committee later in conjunction with the S. A. E. As a result of a questionnaire sent out by this committee, it was learned that opinion is practically unanimous that the $14\frac{1}{2}$ deg. pressure angle tooth should be made the standard for this kind of gearing. A width of face equal to three times the circular pitch was also generally favored, though in the discussion following the presentation of this report it was pointed out that this gives too narrow a face for very coarse teeth. A hub diameter equal to twice the diameter of the bore was recommended, and consideration was also given to the minimum thickness of the hub at the keyway. As regards methods of calculating the strength of gears, the Lewis formula and the Barth modification of same are in general use. Another factor that will be considered in the future is commercial pitch line speed limits.

The advantage of standardizing spoke and rim sections was pointed out. Almost every gear manufacturer is daily estimating on gears which are similar in size to patterns he carries, but which have different forms of spokes. This is very expensive and could be eliminated by the standardization of spokes. In the discussion on this report, Mr. Hamilton suggested that the Bureau of Standards recommendations for limits on the outside diameter be incorporated in the proposed standards. E. W. Miller, of the Fellows Gear Shaper Co., spoke against the adoption of the $14\frac{1}{2}$ deg. tooth as a standard. He referred to the interference difficulty encountered with the $14\frac{1}{2}$ deg. tooth in pinions with a small number of teeth, which is overcome if the 20 deg. pressure angle is adopted. J. B.

Footnote said he had found it impossible to make the stub tooth operate as quietly as a full depth tooth. He believed in the 20 deg. pressure angle but the teeth should be made of the full depth. In answer to a question, he said that his observations applied to hardened as well as to soft gears.

Bevel Gear Committee Report

F. E. McMullen, of the Gleason Works, presented the report of the Bevel and Spiral Bevel Committee. This comprised tables giving the dimensions of parts of long and short addendum bevel gears with $14\frac{1}{2}$ deg. pressure angle, covering the range of 14 to 25 pinion teeth and 3:1 to 8:1 ratios. For pinions of less than fourteen teeth it was recommended to change over to the 20 deg. pressure angle or to spiral bevel gears. With 20 deg. teeth, no pinion with less than 12 teeth should be used. This committee plans to print during the winter charts and explanations of the method of deriving the standards and to present at the next meeting of the Association tables covering in full all $14\frac{1}{2}$ and 20 deg. straight bevel gears.

C. R. Weiss, of the Link-Belt Co., made a report for the Sprocket Committee. Heretofore it has been impossible to do much on sprocket standardization in the A. G. M. A. for the reason that Mr. Weiss' company was the only chain manufacturing company in the Association, but recently the Diamond Chain & Mfg. Co. and the Whitney Mfg. Co. have also joined. Mr. Weiss gave a brief outline of the present situation with regard to roller chain standardization. He said that the standard chain component parts had been adopted by the S. A. E. and that the A.S.M.E. would soon have a meeting at which they hoped to adopt standard roller chain sizes. The Diamond Chain & Mfg. Co. had a very satisfactory sprocket cutter with a constant pressure angle of 20 deg., and it was hoped to adopt a compromise form of cutter, which would allow of cutting the whole range of sprocket sizes by means of six different cutters.

Composition Gearing

The report of the Composition Gearing Committee was presented by John Christensen. Standards for such gearing have already been adopted by the A. G. M. A., but it has been found necessary to make certain slight changes in these standards. For instance, the present standard specifications mention Fabroil as one of the materials to which the rules laid down apply. It has been found, however, that Fabroil cannot be cut by the same methods as rawhide and bakelite, and as, moreover, this material is at present being used only by one concern, it was decided to strike it out from the materials enumerated in the standard specifications. It was also found that the thickness of the metal retainer plates as specified in the standards is too small, and this feature will have to be revised.

During the afternoon session, W. H. Phillips, of the R. D. Nuttall Co., made a report for the Committee on Gears and Pinions for Electric Railways and Mines. This committee found it necessary to co-operate with the American Electric Railway Association, which latter has an equipment committee which has issued specifications covering different forms of street railway equipment. A proposed standard, formulated by this Committee, was accepted at a previous meeting of the A. G. M. A., but when it was presented to the American Electric Railway Association, that Association had already made its specifications for the current year. It is proposed to hold a joint meeting with the American Railway Association next spring, and the committee hopes to present a report at the next meeting of the A. G. M. A.

Henry J. Eberhardt presented the report of the Key-

way Committee. This committee proposes that the nominal size of square keys for standard shafts shall be one-quarter the shaft diameter, and the depth of the keyway one-half the width. In the case of tapering keys, the taper shall be $\frac{1}{8}$ in. per foot, or one in ninety-six. It is proposed to adopt the S. A. E. standard shaft fittings, including taper, square, four, six, ten and sixteen spline fittings.

A. F. Cooke of the Fawcus Machine Co. read a report on herringbone gearing. This committee will make nine recommendations regarding herringbone gears at the next meeting of the Association. At the conclusion of Mr. Cooke's report, some discussion ensued regarding the subject of staggered and non-staggered teeth in herringbone gears. Mr. Markland suggested that staggered gears be entirely eliminated from consideration in the standard. In a staggered herringbone gear, two teeth will be in contact at one time on one side and three teeth on the other side. At the next moment the situation has changed. This causes a pulsation which is very objectionable with certain kinds of teeth. Mr. Miller pointed out that there is now a tendency to make the constant mesh gears of automobile transmissions of the herringbone type. It was also brought out that in ship propulsion work helical gears with special long teeth are being used, the pressure angle being between 14 and 16 deg. F. E. Eberhardt said he had made some staggered herringbone gears for low speed work and had found them entirely satisfactory, there being no back and forth motion.

Plan to Adopt S. A. E. Steels

C. B. Hamilton, Jr., of the Hamilton Gear and Machine Co., made a report for the Hardening and Heat Treating Committee. This committee held a meeting at Syracuse about a month ago, at which three members were present. In the first place the committee desired to have its name changed to Metallurgical Committee. It was proposed to drop the A. G. M. A. designation for steels and adopt the S. A. E. numbers instead. The S. A. E. steels which it is recommended to use for gear work are as follows: Nos. 1010, 1020, 1030, 1045, 2315, 2345, 3115, 3215, 3245, 3315, 3340, 6120, 6145. In the specification No. 1045, it is proposed to make a slight change, however. This specification calls for 0.60-0.90 per cent manganese, and it is proposed to reduce this to 0.30-0.50 per cent, so as to render the steel safer for water quenching. This has been taken up with the S. A. E., the suggestion being to call this steel the S. A. E. No. 1045 special.

A very interesting report was presented by E. J. Frost of the Frost Gear & Forge Co., who is chairman of the Inspection Committee. C. A. Johansson of the well known gage making firm has been experimenting for the committee on plug gage sizes. It was desired to know how much smaller a plug gage of a given size would have to be than the specified size of the hole, in order to demonstrate commercially that its specifications had been lived up to. A hole size of one inch was taken for the demonstration, a ring gage was made exactly to this size, and five plug gages were submitted, varying by small amounts, and from these it was determined that to use commercially the plug gage would have to be about 0.00025 in. small. From these experiments deductions were made as to the proper sizes of plug gages and necessary tolerance for wear before discarding the gages.

The committee recommends that cylindrical holes up to 3 in. in diameter be inspected with "will and will not go" plug gages, the "will go" end to be the same as the smaller limit and the "will not go" end the larger limit given on the customer's drawing; that for holes between 3 and 12 in. in diameter, bar gages be used, in which there are two bars at right angles to each other, held together by a

handle pressed into a hole in the middle of each bar, one bar being the "will go," and the other the "will not go," the nature of the piece being inspected, principally for the length through the bore, determining the length of the connecting handle, and whether the bars shall be close together or at opposite ends.

Methods of Distributing Overhead Expense

At the Friday morning session Christopher Haigh presented his paper on Machine Rate Method of Distributing Expense. He said there were four different methods in use for distributing overhead expense over the product, namely, the man rate method, the man hour method, the sole hour method and the machine rate method. The speaker pointed out the good features and weaknesses of each method and reached the conclusion that the machine rate method is the most logical where a variety of product is turned out and equipment varying greatly in cost is used. It requires a little more clerical work, but this should not add more than 5-10 per cent to the overhead expense.

In the discussion, President Sinram expressed the opinion that no industry needed accurate cost systems more than the gear industry. There were in the Association quite a number of concerns which had grown from small beginnings under their present managements and which would probably be reluctant to give up their present systems, as they were making money. However, a good cost system would ease the burden on the management.

The question was brought up as to how to distribute advertising expense when bringing out a new line and advertising heavily in consequence. Mr. Dunn said that the advertising of a new line should be charged to commercial development. In illustration of the value of an efficient cost system one member pointed out that during the war they, like many other concerns, had an insufficient number of Gleason spiral bevel gear cutters, and as not enough of these machines could be obtained they formed the neck of the production system and, in consequence, these machines were worth \$50 per hour. After this was determined by the cost system instructions were given to the repair department to start work on any of these machines immediately they were brought into the department. Mention was made of one firm which, after installing an efficient cost system, found that one department which it had considered particularly profitable was actually losing money, and in consequence this department was discontinued and another profitable department expanded. The opinion was also expressed that the low prices sometimes quoted on large gears were simply the result of unscientific cost keeping, the bidders not knowing what the gears would really cost them.

It was decided to hold the next annual meeting of the Association in Cincinnati. It is hoped to secure for this meeting a very large attendance, as a great amount of standards work will come up for final action.

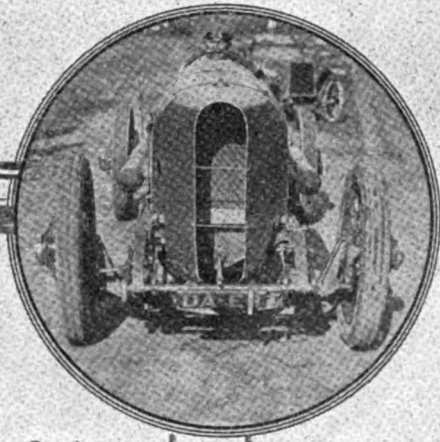
The Utrecht Fair

THE attention of American manufacturers to the Utrecht, Holland, annual spring fair is called by a recent bulletin of the American Express Co. The fifth fair, which will be held in the spring of 1921, will take on an international character, as it will be opened for the first time to all manufacturers. Heretofore, it has been reserved exclusively for Dutch products, but foreign exhibits will be welcomed next spring. The New York Chamber of Commerce for the Netherlands, 2 Battery Place, New York City, will give any information desired concerning this fair.

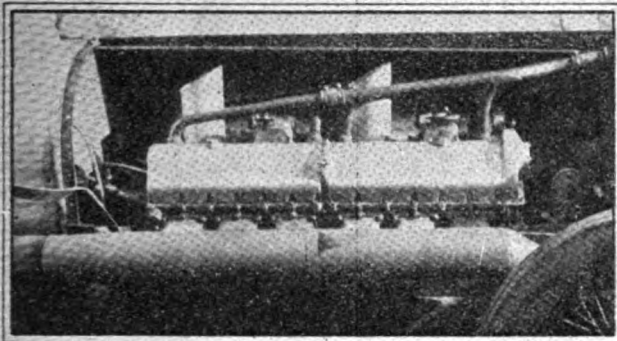
Notes and Photographs of the Gaillon Hill Climb



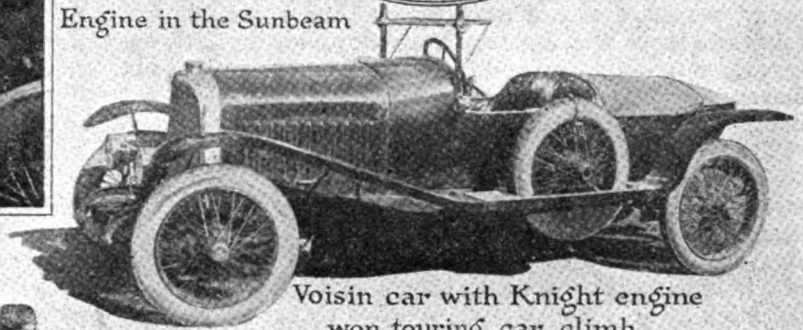
12-cylinder Sunbeam, winner of Gaillon hill climb



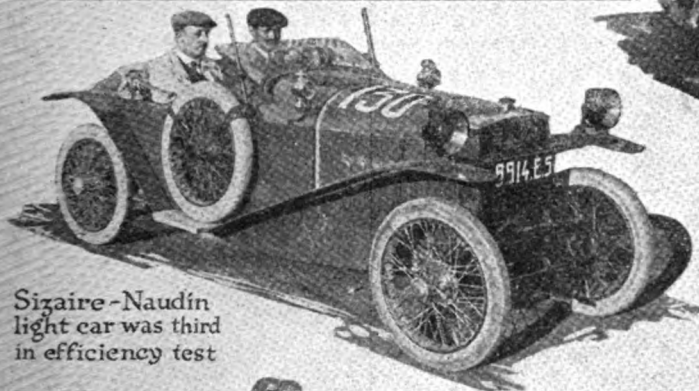
Front view of the winner



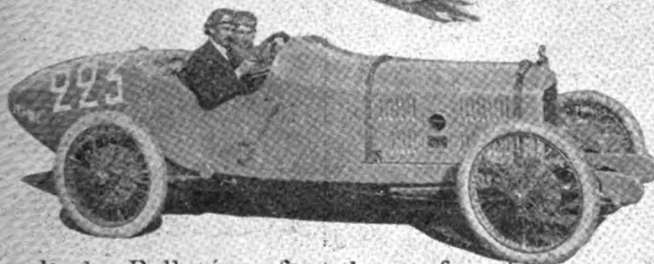
Engine in the Sunbeam



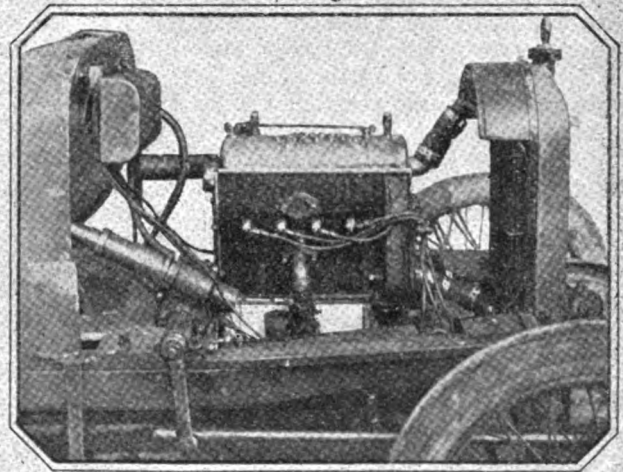
Voisin car with Knight engine won touring car climb



Sizaire-Naudin light car was third in efficiency test



4-cylinder Ballot won first place on formula



4-cylinder, overhead valve Majola, 83 cubic inch racer at Gaillon

A 450-HP. Sunbeam racer broke all records in the Gaillon hill climb in France by making the flying kilometer up the 10 per cent gradient in 20.6 seconds, or at the rate of 108 m.p.h. The official record for the hill was made on a German Benz in 1913 in 23 seconds. The winning Sunbeam was driven by René Thomas as a single-seater, with 120 pounds of lead carried as representing the weight of the mechanic. The car was equipped with four Hartford shock absorbers per axle and ran on Palmer cord tires.

The second fastest time was made with an eight-cylinder Ballot, used in the Indianapolis race. This time was 22.6 seconds. A special four-cylinder 2.7 x 5.1 in. Ballot

racer was the third fastest car, making the climb in 31 seconds. This car, having a piston displacement of only 116 cu. in., was built by Engineer Benry for a demonstration run at the Indianapolis race, but was not brought to this country.

A Licorne racer of four cylinders, with only 80 cu. in. displacement and weighing 1560 lb., showed a speed of 63.1 m.p.h. in the climb. Nearly 100 touring cars were entered, and the fastest of these was the Voisin with Knight engine, having four 3.7 x 5.5 cu. in. cylinders. This car made the hill at the rate of 60.3 m.p.h.

The Gaillon hill climb is the oldest event of its kind. The kilometer climb is made from a flying start.

French Tractor Trials Are Merely a Demonstration

Much disappointment is expressed by farmers that fuel is not measured and other steps taken to show the economy of the various types of machines. Foreign machines outnumber those of French origin. Subsidy by government to encourage use and manufacture of French tractors.

By W. F. Bradley

THE French annual tractor trials were held at Chartres the second week in October, when 108 machines of 63 different types were on exhibition and more than 3000 acres were plowed in six days. The event was more of a demonstration than a competition, for while there was a 48-hour non-stop plowing test, entry was not obligatory and the fuel consumption was not measured. In addition, draw-bar tests were held, but nobody was obliged to submit to them.

The Association of Tractor Manufacturers is responsible for the event, and their idea appears to be that more benefit can be obtained from a big demonstration than from a rigidly controlled competition. As a demonstration the event was ideal, for Chartres is the center of an important agricultural region and Paris is only 60 miles away. The feeling is growing, however, that farmers need more assistance in making a choice than can be obtained from a demonstration. It was particularly in regard to operating costs that information was asked for, but was not forthcoming.

High grade gasoline costs in France from \$2 to \$2.30 per American gallon, and this alone is quite sufficient to cause farmers to hesitate, apart from the vagueness existing as to the actual consumption of the different machines. Kerosene is put forward as an alternative fuel by many makers, but real doubt exists in the minds of French farmers regarding the practicability of this fuel. They are not convinced that the demonstration machines really are running on kerosene, and even if this doubt is dissipated, there is a suspicion that kerosene is injurious to the engine. A series of seriously controlled trials would do much to remove all such fears and would give the farmers the definite information they are so much in need of.

Government Credits to Encourage Tractor Use

The French Government has recently voted credits of \$3,000,000 for the encouragement of the agricultural tractor industry, but it has not yet been decided in what way this money will be spent. At present, any group of farmers purchasing a tractor can obtain a subsidy equal to 10 per cent of the purchase price of the machine if it is of foreign origin, and 25 per cent if the machine is of French construction. It is believed that these subsidies will be continued, and there are hopes that the amount will be increased and that the money will be paid not only to group purchases but to individual farmers. Naturally the object of the group subsidy is to encourage the small farmers who could not individually purchase a machine.

The suggestion has been made to the Government

that the best way of encouraging the use of tractors would be not by a subsidy on the purchase price, but by preferential prices for gasoline. It is proposed that there should be special tinted gas sold to farmers only, free of all State taxes. During the war the method of tinting gas was employed by the army to prevent the fuel getting into the hands of civilians.

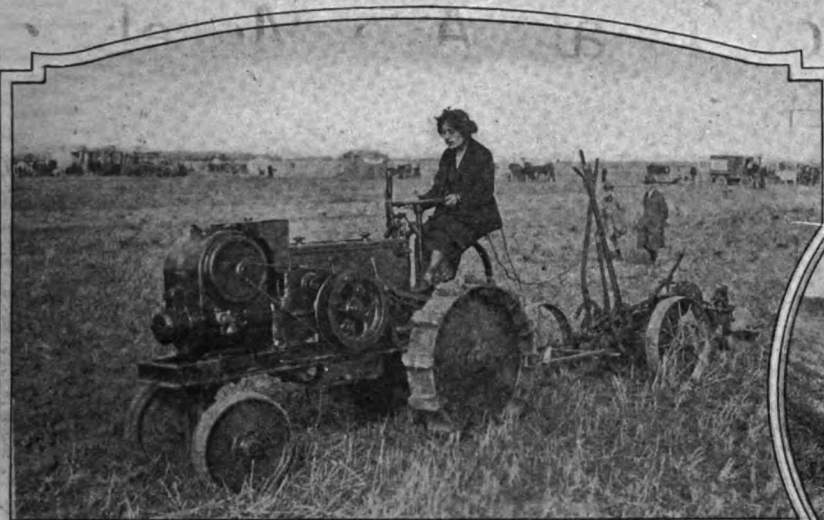
Although French manufacturers are making an effort to get the tractor industry into their own hands, foreign machines are still in a majority. At the Chartres trials were 33 imported types, the majority of them being American and 30 of French origin. In this latter class were several of foreign design and French construction, such as the British Saunderson and Austin, the Italian Pavesi built by the Brasier group, the Cesar tractor made by the Doriot-Flandrin & Parent Co., etc. A few French makers, among them Sizaire-Naudin, are merely marketing an American machine. Some small firms put an American tractor on the market with the name plate changed.

Great Mechanical Variety

By reason of the extensive importation of American, British and Italian machines, added to those of purely French design, the Chartres trials afforded immense mechanical variety. The independent tractor hauling a plow, or other agricultural implements, is in the majority, but almost every other type of machine can be found. De Dion-Bouton adheres to the cable type of machine, operating in pairs, one at each end of the land to be plowed. Two different types are manufactured, although the 50 hp. machine, with a 4-cylinder 5 x 6-in. engine, is the most extensively used.

Delahaye has a self-contained machine, with four-cylinder 4 x 6.2-in. engine placed transversely and a double self-raising plow placed in front and behind. Latil, another big French manufacturer, has a distinctive design, for although the tractor is designed for direct haulage of its own self-raising plow, any other implement can be substituted. Renault adheres to the track-laying type of tractor based on the small tanks he built during the war, but recently redesigned in order to get lower weight and make the machine more suitable for work on land. Fiat has a four-wheel type, frameless tractor on similar lines to that of the Ford. The significant point is that of the half-dozen really big Continental manufacturers no two have the same type of machine.

Among the new tractors one of the most interesting was the Delieuvin, which appears to be an offshoot of the De Dion-Bouton company. This is a three-wheeler, with a 15-hp. engine in front and power transmitted



The Dubois light tractor

Delieuvvin light-
3-wheel tractor



The Bauche
agricultural machine



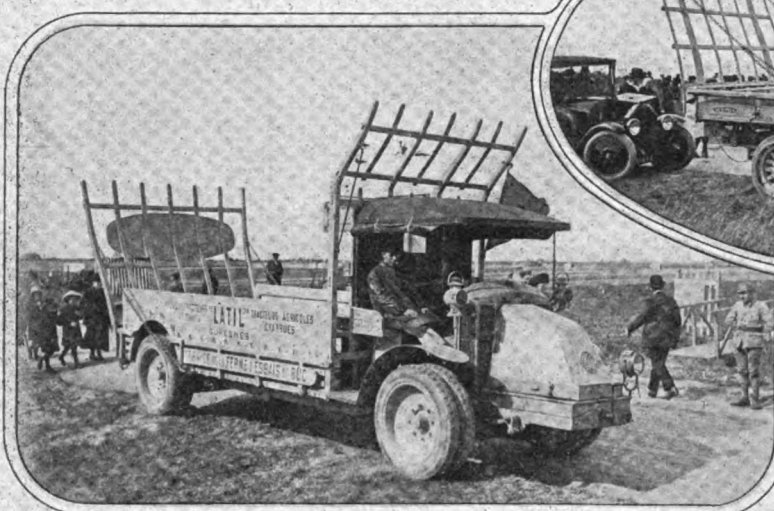
The Chapron
light tractor



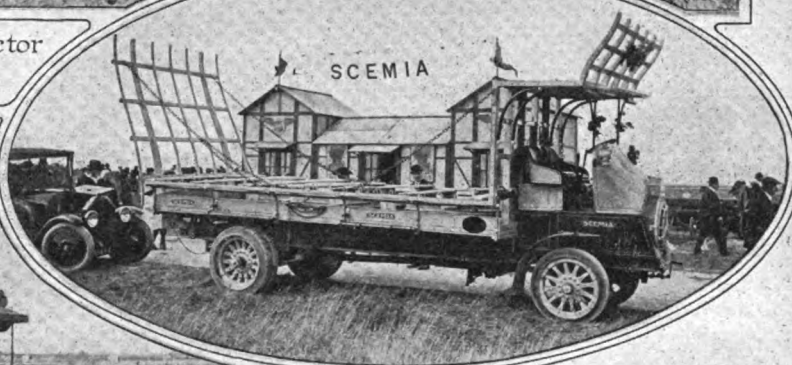
Cesar tractor
built by the-
Doriot-Flandrin
and Parent Co.

Fiat tractor
in
Chartres trials

Aurore 4-wheel drive tractor



Latil pneumatic tire truck for agricultural work

The agricultural truck built by
the Paris General Omnibus Co.

through a clutch, gearbox and side chains to the two rear wheels. In addition to this there is a supplementary drive by means of a central chain to a supplementary double wheel mounted at the rear between the frame members. When running on the road this wheel is not in contact with the ground, and it is not brought into contact until the pull on the drawbar is equal to 1000 lb. The greater the pull the greater the adherence of the wheel. This result is obtained by pivoting the supplementary wheel and attaching the tow hook to one of the arms of a bell crank. The lower the hook is attached the greater the leverage obtained and the more the supplementary wheel is brought in contact with the ground. Except that it was of light construction, the tractor did not present any other features of unusual interest.

A lot of attention is paid by the French to small tractors of not more than 40 in. overall width, for working among vines or in plantations. One of the most important of these is the new Citroen, a machine designed very closely on the lines of that maker's passenger car. The same cylinder block is used as for the car, and there is the same general arrangement of clutch and gearbox, with the difference that the housing forms the frame of the machine. The engine is governed to 1650 r.p.m. and

a special double cone clutch, with the small diameters placed end to end, is employed. Final drive is by means of internal gears to disk wheels. Citroen is just getting into production on this machine.

Another interesting type was the two-wheel Agro fitted with the Major two-stroke engine. This is the engine which recently created some sensation by winning the French cyclecar race against four-stroke machines of equal piston displacement. It has two cylinders with a common combustion chamber, one of the cylinders admitting the charge and the other exhausting it, while compression is carried out in the basechamber. The agricultural machine is a two-wheeler to which a plow or other implement can be attached. It had much to recommend it for the small farms common in France.

Doriot-Flandrin & Parent, a well-known automobile firm, is in construction on the Cesar tractor, a machine apparently of American design, very suitable for French conditions. This is a 12-hp. tractor with a width of 40 in. in front and from 43 to 60 in. in the rear, with the four-cylinder engine mounted fore and aft on one side and the radiator on the opposite side. It has a central self-tracklaying band and a rear carriage consisting of an axle and two wheels pivoted to the fore-carriage.

Another interesting vineyard tractor is the Dubois,

the width of which is 37 in. and wheelbase 60 in. This is a four-wheel machine with a horizontal single cylinder engine completely enclosed. It has two speeds by means of planetary gears and final drive by enclosed side chains with a locking mechanism, allowing all the power to be transmitted through one wheel, if necessary. This machine is designed to be run on narrow-track railroads.

Some attention is being given to light four-wheel drive tractors for use on land. Two of these were shown. The *Aurore*, which is built by the Gnome & Rhone Co., weighs 3500 lb., is driven by a Ballot four-cylinder 3.1 x 5.5-in. engine, and makes use of cardan shafts and bevel gearing to transmit the power to the wheels. The tractor has three speeds ahead and reverse, and although all four wheels are steerers, it is operated shuttle-wise when on the land.

In the *Valere-Chochod*, a four-wheel driver weighing 5200 lb., the two wheels each side are connected by enclosed chains and by means of a double clutch either left or right-hand wheels can be driven independently. This machine is operated by a Ballot four-cylinder 3.5 x 5.5-in. engine.

This year for the first time manufacturers are paying special attention to trucks for farm service. Some of these, such as the *Fiat* and the *Scemia* (a branch of the General Omnibus Co.) are standard trucks with bodies specially designed for farm service. The *Latil* company has a special farm truck mounted on dual pneumatic 37.5 x 6-in. tires front and rear, together with Michelin steel disk wheels. On this truck the front wheels are both drivers and steerers, and as there is no mechanism back of the front axle, a very low, long platform is secured. Although there is plenty of clearance, the height

of the platform from the ground is only 28 in. The truck is built to carry 2-ton loads, and according to tests made on French farms will do the work of 12 horses and 3 wagons.

Renault showed his 3-ton pneumatic-tired truck with special body for milk delivery, also his 3- and 5-ton trucks with all metal self-tipping bodies controlled by hand and hydraulic power.

America did not exhibit any trucks, but practically all her agricultural tractors were on exhibition, prominent displays being made by Cleveland, Fordson, Case, Holt, Bull, Steel Mule, Gray, Moline, International, Sandusky, Hart Parr, etc. Several types of stationary engines found exhibition space, but there was not a single farm lighting set on the grounds.

As the direct result of the demonstration, sales have not been high, for no maker claims to have sold more than three or four tractors, and many admit they have sold none. Farmers in general are holding off on account of the high cost of fuel and also under the impression that additional government assistance may be expected.

The 48-hour plowing test has only served to raise a mass of protests, several of the makers refusing to admit the figures issued by the technical committee. The greatest amount of land plowed within the time limit was done by the Holt Caterpillar, but this had a much more powerful engine than any of the others and hauled nine bottoms. This trial would only be of real value if the fuel consumption also were published, and it does not appear that this has been controlled. Protests have been lodged against two French makers who are said to have changed their machines during the night.

Pressure Drop in Radiator Air Tubes

THIS report (No. 88 of the N. A. C. A.) describes an investigation of effects of pressure drop in radiator air tubes, conducted for the National Advisory Committee for Aeronautics at the Bureau of Standards.

A small steel tube—0.04 in. outside diameter and 20 in. long, with a static pressure opening near the center—was stretched through an air tube of a radiator and used to measure static pressure in the stream of air passing through the radiator tube. The measurements lead to the following conclusions:

The drop in static pressure in the air stream through a cellular radiator, and the pressure gradient in the air tubes, are practically proportional to the square of the air flow, for a given air density. The observed values of skin friction agree approximately with those found by other investigators for long pipes. These facts appear to indicate that the air flow is turbulent, even in the short tubes of the radiators.

The difference between the head resistance per unit area and fall of static pressure through air tubes of a radiator, noted by various observers, is shown to be apparent rather than real.

Radiators of different types differ widely in the amount of contraction of the jet at entrance.

Frictional resistance is found to be two-thirds of head resistance for one type of 11/32 in. (0.87 cm.) circular cells, 5 in. (12.7 cm.) deep; and one-half of head resistance for one type of 5/16 in. (0.79 cm.) square cells, 4.8 in. (12.2 cm.) deep.

Supplying heat to the radiator increased the pressure gradient in the tubes of one type, of 1/4 in. (0.64 cm.) circular cells, 4 in. (10.2 cm.) deep, by about 15 per cent for a mean temperature difference of 110° F. (61° C.) be-

tween the water and the air entering the radiator tubes.

A copy of the real report may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.

British Tractor Trials—The Judges' Awards

THE judges of the British Tractor Trials at Linco'n, England, which concluded with a series of supplementary tests, plowing on hill land being included, have issued their awards, though a detailed report will probably take some time to prepare. These trials were described in *AUTOMOTIVE INDUSTRIES* of Oct. 28.

The following are the judges' allotments, the first prize in each case being a gold medal and \$100 in cash:

Class I (tractors up to 20 hp. plowing 2 furrows 10 x 6 in.)—First, Case; second, Cletrac.

Class II (tractors up to 30 hp. plowing 3 furrows 10 x 6 in.)—First, British Wallis; second, Peterboro.

Class III (tractors over 30 hp. plowing 4 furrows 10 x 8 in.)—First, Lauson (the only award).

Class VII (motor plows with not more than 4 breasts 10 x 8 in.)—First, Crawley; second, Moline.

Classes IV, V and VI comprised cable plowing sets and one steam tractor, four entries in all with three first prizes!

Great surprise has been expressed at several of the awards. Needless to say unsuccessful entrants are dissatisfied and are making formal protests. Until final awards are announced the manufacturers will not know in which features they are alleged to have failed.

An Engineering Study of the Internal Gear Axle

This general discussion of the problems in the bevel gear drive is illustrated by an individual study of the chief makes of such axles now manufactured for use in both passenger cars and commercial vehicles. We regard this as an especially comprehensive study.

By A. C. Woodbury*

WITHIN its limitations of gear reduction and ground clearance the bevel gear drive is supreme for commercial as well as passenger cars. To secure its simplicity, sacrifices are sometimes made of other desirable points in design. Also, the legitimate field of the bevel gear drive is being extended by the continued development of the spiral bevel pinion and special tooth forms, making possible greater gear reductions and higher torque within the same limitations of housing diameter or ground clearance, while the requirements as to gear reduction are in some cases being made easier by the extension in the use of pneumatic tires, with increased speed capacity. However, the increased speed capacity does not infer a lower maximum torque unless because a vehicle of a given capacity is to be used for a different class of haulage, and it is often accompanied by an increase in wheel diameter requiring an increased torque.

At the present time the greatest bevel gear axle reduction in commercial use seems to be 6 to 1, and there are a number of examples of both worm and internal gear axles having reductions of less than that ratio, beginning at about 5.25 to 1. This seems to rule out the bevel gear for any truck of more than one ton rated capacity. Chain drives are obsolescent. They still are retained on a few models, especially heavy trucks and road tractors, as natives hold remote fastnesses on a conquered island but any new development is pretty sure to follow other lines.

Comparison of Truck Axle Types

There remain, then, three types of axle drive available for the commercial car of over one ton capacity. These are generally known as the worm gear, the double reduction, and the internal gear. The distinction between the last two types is not well drawn, as both of them have double gear reductions. The essential point of difference is that one type has the two reductions in one assembly at the center of the axle with axle shafts directly coupled to the wheels or having the wheels mounted directly on them, while the other type has one reduction at the center of the axle and the second reduction in duplicate at the driving wheels, the shafts therefore rotating at a higher speed than the wheels. This last classification includes some axles differing considerably from ordinary internal gear drive practice, even to the extent of having no internal gears attached to the wheels.

The worm gear axle leads the field to-day by a wide margin over all competitors. For the last four years about 65 per cent of all the truck models listed in AUTOMOTIVE INDUSTRIES have had worm drives, the lists including the lighter delivery cars with bevel gear drives as well

as chain drive, double reduction drive and internal gear models. When it is considered that the worm drive was first commercially introduced in this country only ten years ago, this percentage is the more notable. What are the reasons for the great popularity of this type of drive?

In the first place, the worm drive follows the bevel gear drive so universally used in passenger cars in the general lines of its design and in the prime virtue of simplicity. Like the bevel gear drive, it can be made either semi-floating or full-floating. All the parts requiring lubrication, excepting, of course, the wheel bearings, are easily enclosed in a housing that retains the lubricant and excludes the dust and mud. The worm drive is noiseless. A minor advantage is that an approximately straight line drive is possible without inclining the engine.

Against these virtues are some faults. The worm drive axle is several times heavier than the chain driven axle that it supersedes, referring to the unsprung weight which most affects tire wear, etc. There is more friction in a worm drive than in a double reduction drive, either through two pairs of gears or through one pair of gears and one chain, with everything in good condition. The friction rises at low speeds, affecting starting effort required and hill-climbing ability, with maximum effect on ability to start up-hill after standing long enough for the oil to drain away from the worm. The friction also causes heat and expansion of the worm and gear that can cause trouble with bearing adjustments and gear clearances if the design does not sufficiently take these items into account. Improper lubrication aggravates the heating, and lack of lubrication is greatly fatal.

Virtues of the Internal Gear Drive

The internal gear drive axle is generally much lighter in weight than the worm drive, and since the total weight of both is unsprung, has a considerable advantage, although but a poor second in this respect when compared to the chain driven construction. The weight reduction is due largely to the fact that the differential and drive shafts of the internal gear axle rotate at much higher speed than the corresponding parts of the worm axle and can be made correspondingly smaller and lighter. This reduction in size has also a marked effect on the size and weight of the housing, as a load-carrying housing with flanged joints of large diameter cannot be made light. As generally constructed, the internal gear axle has the advantage of carrying its load on material of much higher tensile strength than a cast housing, thus more than offsetting the weight of the light housing members that have no structural use. The mechanical efficiency is high and not subject to a noticeable drop at low speeds. The

*Consulting engineer, Member S. A. E.

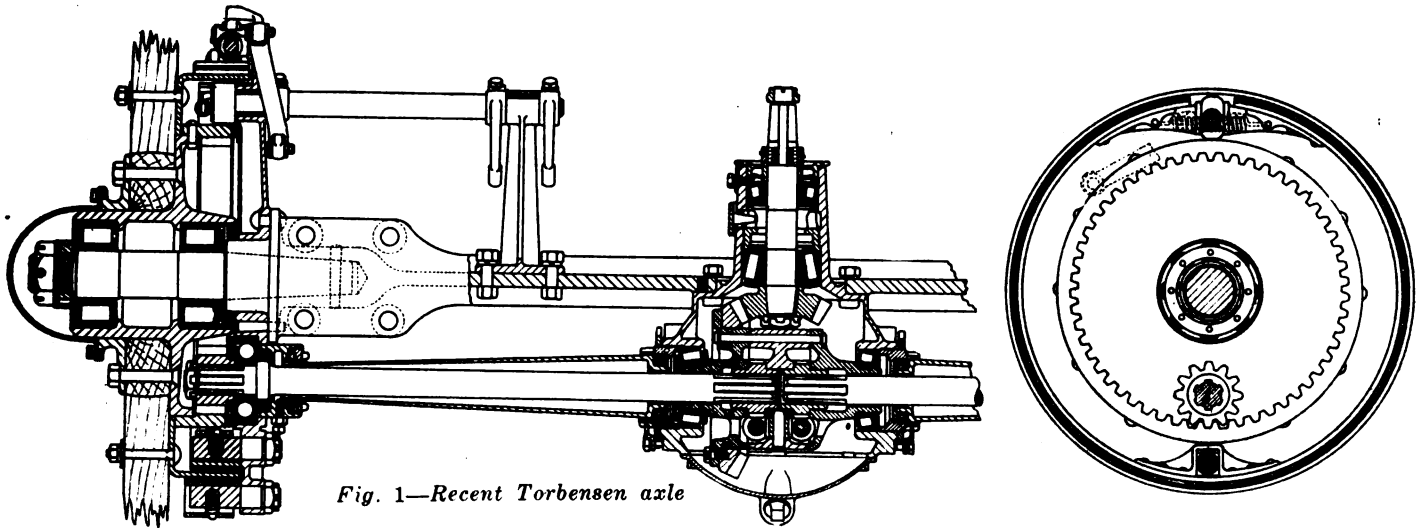


Fig. 1—Recent Torbensen axle

internal gear drive will stand lack of lubrication with less disastrous results than other designs. The ground clearance is greater than with worm drive.

Against these items must be placed certain disadvantages. It is not so easy to enclose the internal drive gear and pinion to retain oil and exclude dust, and many axles have been built that were very imperfect in this respect. Serious deflection of the axle or excessive wear on the wheel bearings may cause improper meshing of the gears, resulting in increased friction, wear and noise. The internal gears themselves have sometimes been improperly mounted on pressed steel brake drums or perhaps even on wooden spokes, so it was difficult or impossible to keep them running true. The internal gear drive is not noiseless and is subject to increased noise in case of defective design or workmanship or excessive wear.

The double reduction axle having all gears at the center of the axle occupies a middle ground between the two already discussed. It can claim the advantage of complete and easy enclosure, and follows bevel gear practice with the addition of a pair of reduction gears that may be included in the same assembly as the bevel gears. It avoids the purely sliding friction of the worm and the effects of misalignment and worn wheel bearings sometimes found with internal gears, but the weight is likely to equal or exceed that of the worm axle.

First Cost Hard to Get At

In the foregoing I have avoided the question of first cost, not so much because it is an item of secondary importance as because it would be difficult to arrive at a fair basis of comparison. The double reduction axle has not been manufactured as a separate article of commerce to any considerable extent, and while the internal gear axle has the reputation of being less expensive than the worm axle, it is at least in part at the expense of imperfect enclosure of the gears. With an axle so built that the internal gear or other reduction at the wheel can be run in oil without leakage on to the brake drum or wheel, as is found in some of the latest designs to be described herein, the difference in cost must be somewhat less, but it ought not to entirely disappear.

No comparison has been made in regard to the important items of durability, reliability and accessibility for the reason that these are more matters of individual design than attributes of the types. If you will take one of the best worm drive axles there is and substitute an inadequate worm thrust bearing for the one in successful use, you will then have sacrificed both durability and reliability, while if you change the construction of the housing and gear mountings so the worm and gear cannot

be lifted out in one assembly you have sacrificed accessibility.

Evaluation of the relative importance of the various virtues and faults enumerated will be left to the reader, as this is, after all, largely a matter of personal opinion and preference. There will be little objection to giving the most weight to reliability and durability, but the relative importance of items like lightness, accessibility, simplicity, efficiency, and quietness, which the writer would place in the order given, are subject to difference of opinion. However, it appears that increased attention is rightly being given to low unsprung weight as a means of reducing tire wear. This question is being brought up particularly in regard to pneumatic tired trucks because of their relatively high speed, but it is equally important with the solid tire because of its lower elasticity.

Well-Known Internal Gear Axles

The use of the internal gear at the road wheel for driving commercial vehicles dates back to the very beginning of the automobile industry in this country, twenty years ago. At least some of the Columbia electric delivery cars built at that time by the Electric Vehicle Co. of Hartford, Conn., had an electric motor for each rear wheel mounted on the under-frame or reach rods connecting the front and rear axles, the drive being by pinions directly on the motor armature shafts meshing with large internal gears mounted on the wooden spokes of the road wheels. The gears were entirely unenclosed and unlubricated, so they were naturally rather noisy, even while they remained concentric. Under ordinary running conditions the approach of the vehicle was well advertised. This, however, was more like the "bull ring" gears used on tractors to-day than the modern internal gear axle.

According to the writer's memory, the first example of the modern type of internal gear drive to be introduced to the American market was on the Mais truck in 1910 or 1911. This truck never attained a wide distribution, and the real beginning of internal gear axle manufacture came about a year later with the introduction of the Torbensen axle as a separate unit sold to the truck manufacturer. Later the Russel internal gear axle was introduced by a manufacturer who had previously been producing chain drive jack shafts and dead axles, and then the Clark axle made its appearance. This put the internal gear drive axle in a position to compete with the worm axle, which was then fighting the chain drive for supremacy.

Within the last two years there have been a number of new makes of internal gear axles announced, as well as axles of other types coming within our extended classification, which includes other drives having reduction directly

at the wheel. While none of these later axles here described has as yet made much headway on the market, except the one built by a truck manufacturing company for its own trucks, the activity in this direction is significant. The end is not yet, for it is known that other manufacturers are working on axles of this type, the details of which are not yet ready for announcement.

Torbensen Axles

Fig. 1 represents a familiar form of the Torbensen axle in the two ton size. The characteristics of this make of axle are that the load is carried on an I-beam forging extending from wheel to wheel, the driving members being located back of the dead axle with the differential housing attached to its enlarged center. The bevel pinion shaft projects forward through an opening in the I-beam. The wheel bearings are not mounted directly on the drop-forged I-beam member but upon inserted spindles of a stronger quality of steel.

The attachment of the differential housing to the center of the load carrying member makes it possible for the housing of the shafts between the differential housing and the wheel pinion mounting to be attached flexibly, this promoting accessibility and tending to keep the pinion in

bearings at the wheels, has double internal brakes instead of external and internal, and the internal gear is mounted inside a flange which entirely surrounds and reinforces it.

Russel Axles

In the product of the Russel Motor Axle Co. the load is carried on a dead axle member of round section extending through from wheel to wheel and having the axle spindles formed on its ends. Fig. 3 shows an axle of $2\frac{1}{2}$ tons nominal capacity of the type which has been made by the Russel company for several years past. Surrounding the dead load carrying member at each end is a large casting on which are mounted the brakes and the ends of the driving shaft housing, which latter is mounted in front of the load carrying member. These castings serve also as spring seats. A distinctive feature of this axle has been that the housing is rigidly attached to its support at one end and flexibly attached at the other while only one of the spring seats is keyed to the dead axle, thus providing a certain amount of flexibility to the structure as a whole.

The wheel bearing arrangement is practically the same as that in the Torbensen axle shown in Fig. 1. The internal gear is fitted inside the brake drum and attached by longitudinal rivets. There is no provision for sepa-

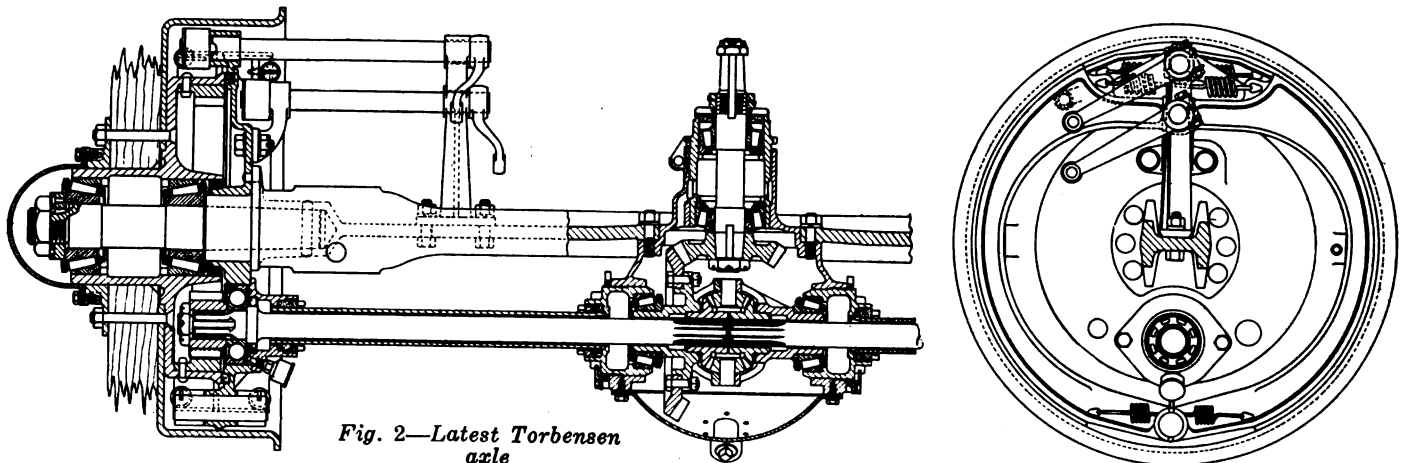


Fig. 2—Latest Torbensen axle

line with the internal gear in case of axle deflection from load.

Enclosure of the internal gear and pinion is secured by a sheet metal plate with a packed band at the inner face of the internal gear. As in most internal gear axles so far manufactured, this construction makes it impossible to run the internal gear and pinion in oil, but lubrication by means of grease cups is provided.

The axle shown in Fig. 1 has straight roller bearings at the wheels, with shoulders for taking the thrust, this being the construction generally followed in the past. The internal gear is mounted on the cast wheel hub with a ring fit and shoulder insuring good support and alignment. Radial rivets hold the gear in place. The brakes are internal and external on pressed steel drums outside the internal gear, the operation of the internal brake being by cam and of the external by toggle levers.

In a larger size of Torbensen axle the arrangement of brakes is modified. A single internal brake is placed toward the center of the car from the internal gear, the drum being of cast metal and combined with the internal gear mounting. A second brake of the external type is placed at the forward end of the bevel pinion shaft. This axle is provided either with hubs for wood wheels or with cast steel wheels.

One of the latest Torbensen axles is shown in Fig. 2. The main points of difference between this and the axle shown in Fig. 1 are that the latter axle uses tapered roller

rating the internal gear compartment from the internal brake, but the brake housing member is fitted around the external brake band in a way which serves well to exclude dust from the gear compartment, and a small plug is provided for the introduction of lubricant for the internal gear.

The latest type of Russel axle is shown in Fig. 4, which represents a 5-ton size. All sizes of Russel axles will soon be made according to this design. The arrangement of the main members is the same as in Fig. 3, but important detail improvements have been introduced. A complete enclosure has been provided for the internal gear in the form of a pressed steel housing attached to the brake support-spring seat member, the closure being completed by a cover fitting the wheel hub between the internal gear and the wheel spokes, an oil throwing ring making the joint more effective. It will be seen that this permits running the internal gear partially submerged in a bath of oil, thus providing for efficient lubrication of the drive, since the oil will naturally be carried up to the pinion as the gear rotates. This construction makes it necessary to attach the internal gear to the hub at a point materially nearer the wheel center than is the rim of the internal gear, and this is accomplished by a row of bolts passing through the wheel near the hub.

The differential housing is made to extend across from one spring seat to the other and is mounted in spherical seats, the torque reaction in the differential housing being

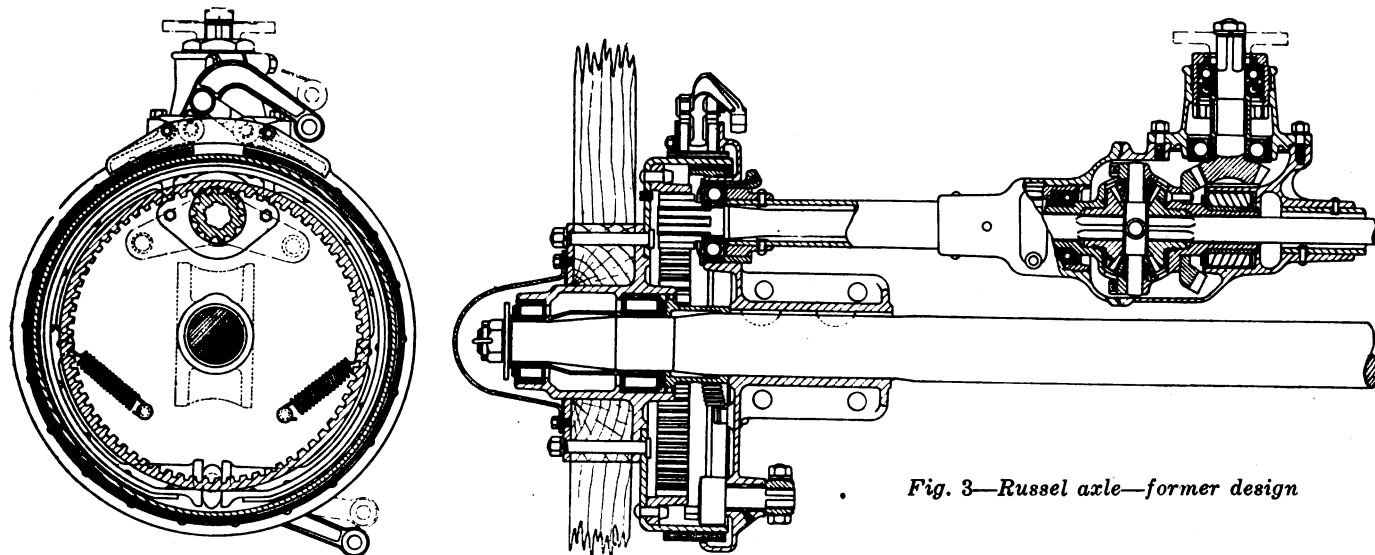


Fig. 3—Russel axle—former design

supported by a short torque arm at each end extending to the back side of the spring seat casting. Short tubes complete the enclosure of the shaft, and a packing around the shaft prevents oil passing from the differential housing to the internal gear. A single set of expanding brakes is provided on this axle, operated by a simple system of levers rather than by cam or toggle. Wheel bearings are of a double row ball type and ball bearings are used throughout.

Clark Axles

In the Clark axle, a round load carrying member is used, similar to that in the Russel axle, except that it is given a horizontal bend in the center in order to clear the differential housing, which latter is in front of the axle in this design also. Fig. 5 represents a 2-ton size of this axle. The design of the complete line is quite consistent, the main difference being that the external brake is omitted in the 5-ton size. In the Clark axle the internal gear drive is enclosed by the brake drum, which is only slightly larger in diameter than the gear, in conjunction with a partition between the internal gear chamber and

the space occupied by the internal brake. There is a packed running joint between this partition and the inside of the brake drum. A large opening with a cover is provided in this partition for the introduction of grease for lubrication of the gears. The brakes are located between the internal gear and the spring seat.

The wheel bearings in this axle are a combination of flexible roller bearings and double row ball bearings, the latter mounted to take thrust in both directions. The housing of the differential and drive shafts is built up from castings, this assembly being attached to the rest of the axle only at its two ends. The internal gear is attached to an enlarged flange on the hub by means of bolts passing through the internal gear ring, brake drum and spokes.

Kennedy Axles

One of the newer designs of internal gear axles is the Kennedy, which is illustrated in Fig. 6. Distinctive features of this axle are that the internal gear is completely enclosed and that the housing of the drive shaft and differential is so mounted that it can rotate with respect

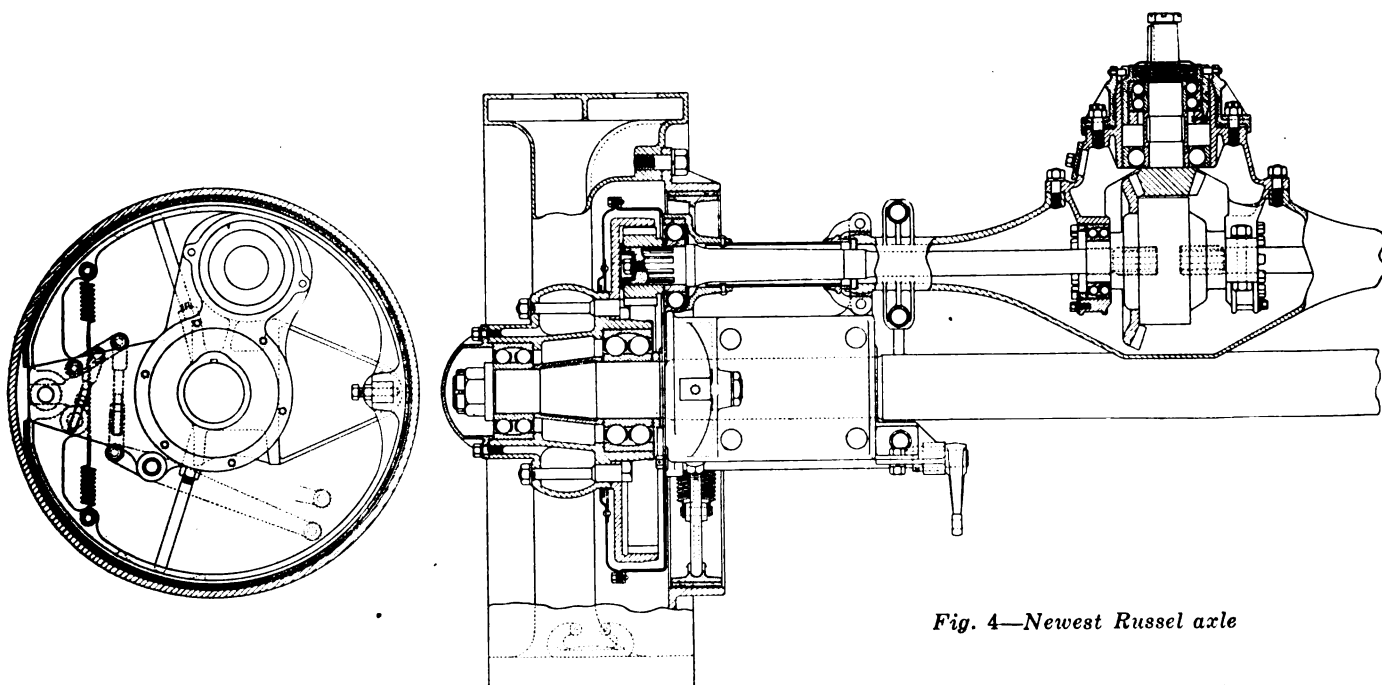


Fig. 4—Newest Russel axle

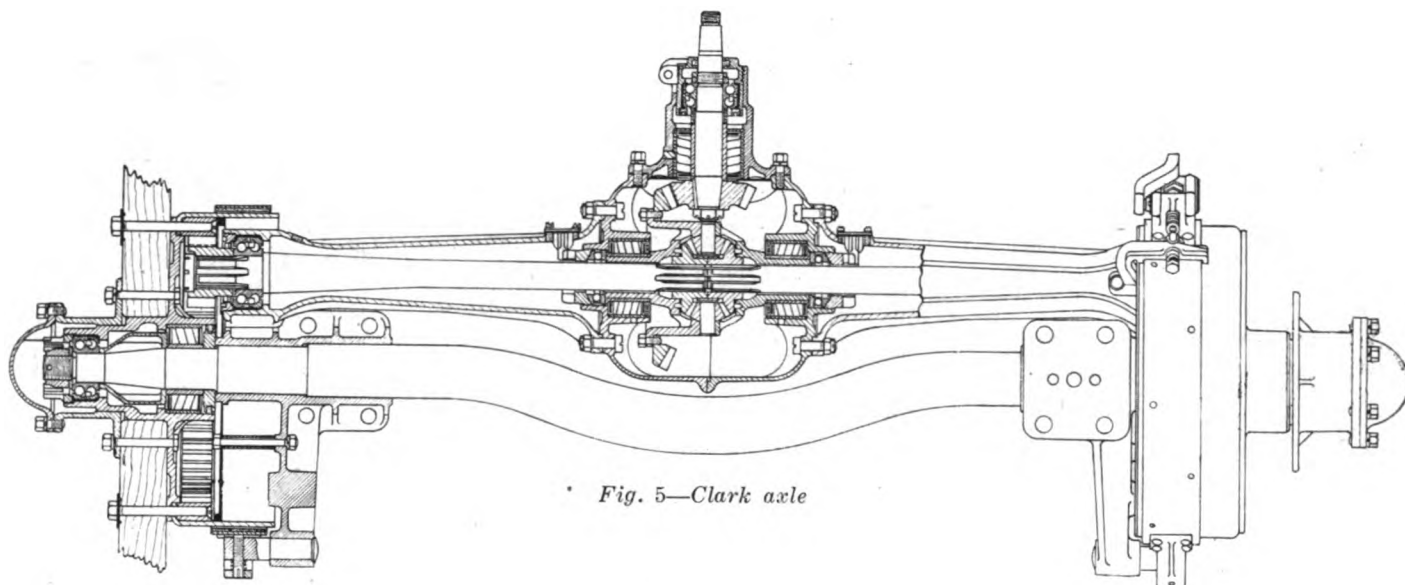


Fig. 5—Clark axle

to the axle except for the restraining influence of four coiled cushion springs, these being introduced to cushion the drive. The load carrying member is a straight round bar with the springs mounted on its ends. The driving mechanism is located in front of the wheel centers, and the differential housing is of notably small diameter, this result being secured by placing the differential at one side of the center of the axle, the bevel drive gear being attached to one end of the differential instead of encircling it as in the other designs shown.

The internal gear is built up from a ring and disk or flange which are riveted together. The flange is attached to the wheel hub by a circle of bolts just outside the inner hub bearing. A two part pressed steel housing encloses the internal gear, openings being provided for the drive shaft and wheel hub, the latter being provided with packings. This provides for maintaining an oil level in which the internal gear dips as it rotates. No attempt is made to prevent the oil in the differential housing from passing through to the internal gear compartment. Wheel bearings in this axle (as in the last described) are a combination of flexible roller and double row ball bearings. The brake drum is attached to the spokes and centered on the spoke flange of the hub. This axle is furnished

either with two sets of expanding brakes at the hub drum or with one set of hub brakes and a brake at the propeller shaft.

The Parker Axle

An axle featuring an enclosed multiple disk brake is the Parker, shown in Fig. 7. As in most of the axles so far described the load carrying member is a straight round bar of steel, and the driving mechanism is placed in front. A large part of the drive shaft housings is cast integral with the spring seats. The space between these two housing portions is filled by a third, which is a pressed steel member open at the front side to receive the differential and brakes. The front opening is closed by three castings, of which the central one is the differential carrier, while the two at the sides carry the brakes and their operating mechanism.

The brakes resemble multiple disk clutches in general structure. There are outer and inner drums with suitable splines to engage alternate disks respectively. The outer drum is bolted to a flange, which is cast with the brake cover before mentioned, while the inner drum is provided with an internally splined hub fitting on the portion of the drive shaft which is splined for the differential

gear, these splines being extended for that purpose. Copious lubrication of the brakes is insured by oil troughs on either side of the bevel drive gear to catch the oil thrown by the gear and discharge it inside the brakes. In order to allow circulation of the oil through the brake itself the rotating disks that are splined to the inner drum are each made up of two duplicate pressings with bosses on their backs. When these are welded together they present smooth outer surfaces with a space between to provide for circulation of the oil. The disks splined to the outer drum are

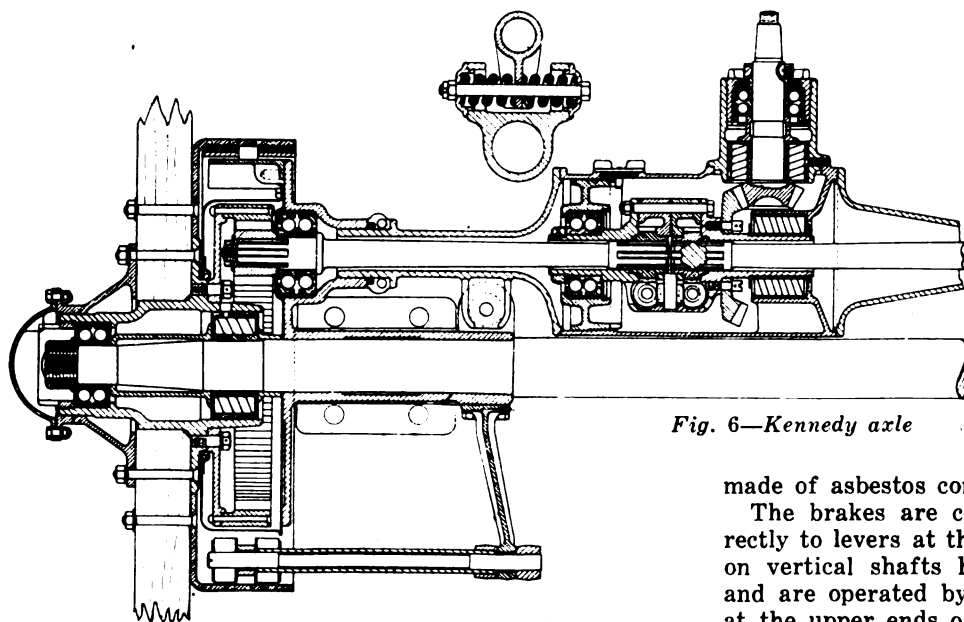


Fig. 6—Kennedy axle

made of asbestos composition.

The brakes are compressed by end disks attached directly to levers at the two sides. The levers are mounted on vertical shafts having bearings in the brake covers and are operated by a toggle linkage between the levers at the upper ends of the two shafts. The toggle applies

equal pressure to the two brakes. When the brake rod pull is released a spring pulls the toggle back into a rest that holds it in the central position, thus insuring equal clearance in the released position. The toggle links are adjustable in length to take care of wear, and adjustable stops are provided for the levers to prevent the toggle from falling outside its rest when returning to the released position.

The internal gear is attached to the wheel hub by a flange, which is riveted to the gear ring at its outer edge and both riveted and bolted to a flange on the hub, this latter flange being formed with integral oil throwing ring and grooves. A sheet metal housing is clamped between the spring seat and bearing spacer, closure being completed by a cover having an oil channel fitting around the oil throwing ring on the hub flange, with drainage back into the gear chamber. The oil in this chamber lubricates the wheel bearings and the pinion bearing, but circulation between the differential housing and internal gear housings is prevented by packed joints around the shafts near the pinions. An unusual feature is that the final drive pinion has an extended hub to which its bearing and retaining nut are attached, while a covered opening is provided in the internal gear cover through which the drive shaft may be withdrawn without removing the pinion. To make a driving connection between the shaft and pinion the latter is castellated by milling into the end in such a way that the cutter does not touch the pinion teeth.

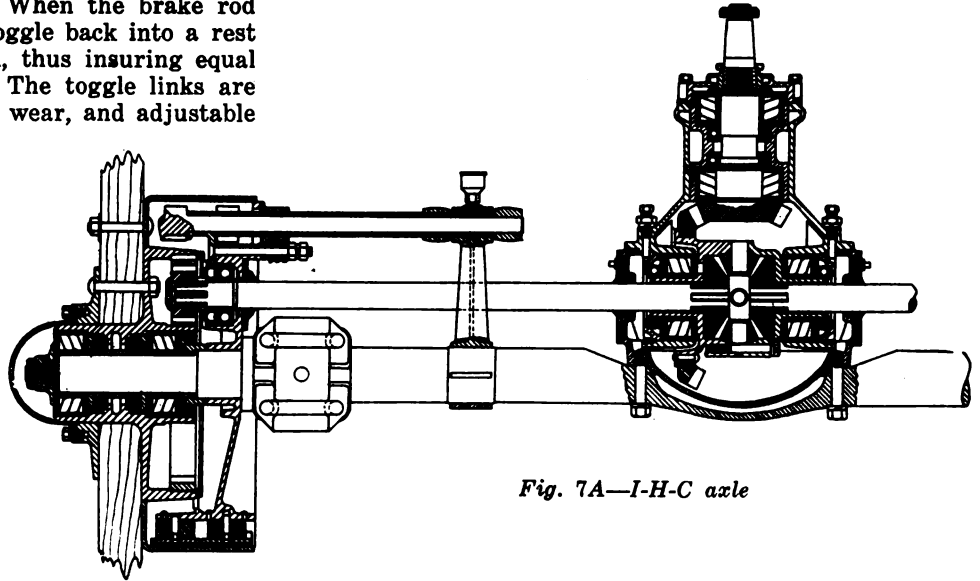


Fig. 7A—I-H-C axle

Fitting into the slots thus formed are six teeth cut in a conical enlargement on the end of the shaft. The shaft is held against endwise movement by a snap ring fitting in a recessed groove cut in both the pinion and a shallow pocket in the end of the shaft.

Wheels are demountable from the hubs. The cut shows a steel flange for use with a wooden wheel, but this can be replaced by a steel wheel. Wheel bearings are a combination of a flexible roller bearing with a double row ball bearing.

International Truck Axle

The axles used on the trucks manufactured by the International Harvester Company have a load carrying member which is forged from chrome nickel steel, the section being round except at the middle, where it is forged out to form a pad about the size of the differential housing. To the front side of this pad the differential housing is bolted,

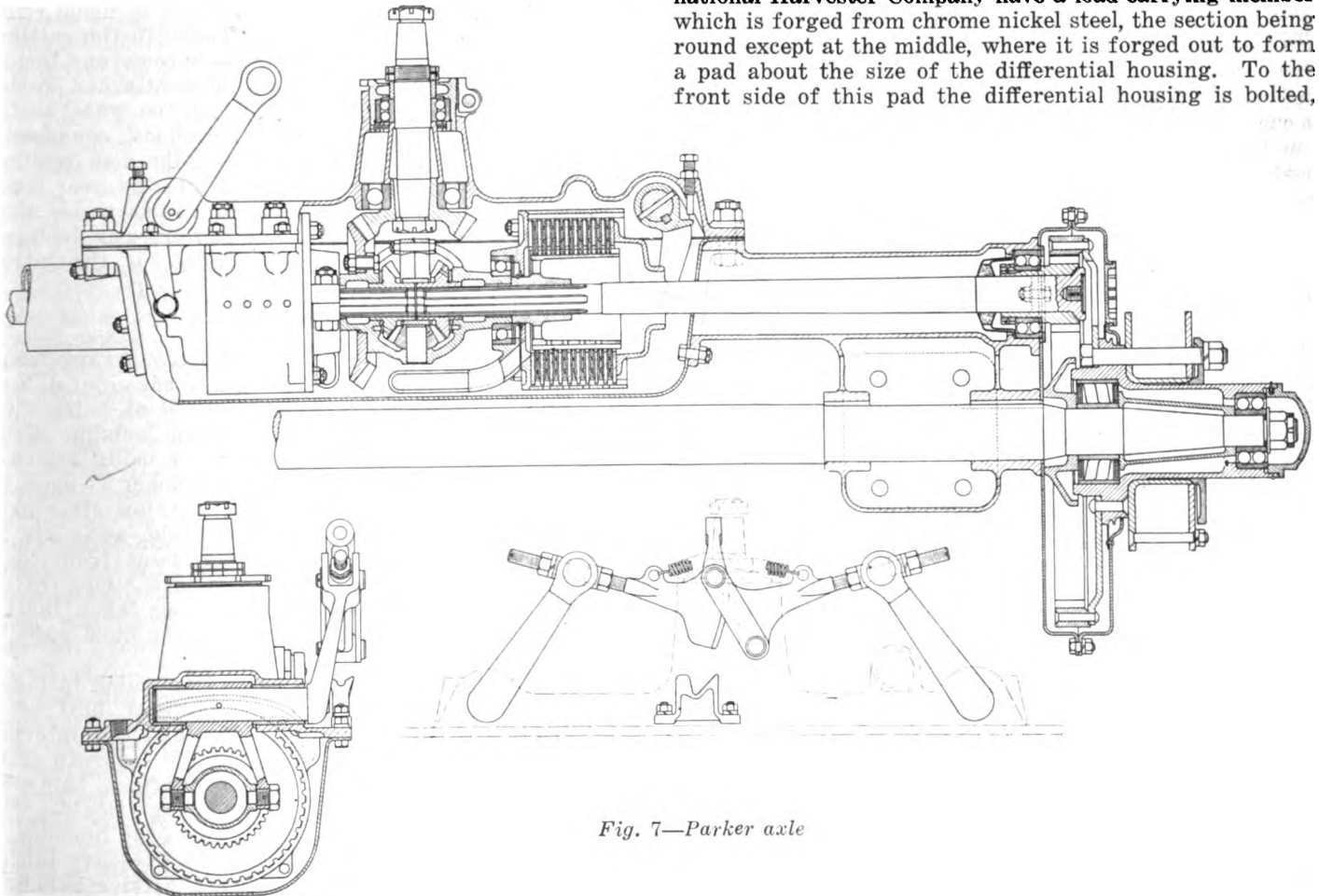


Fig. 7—Parker axle

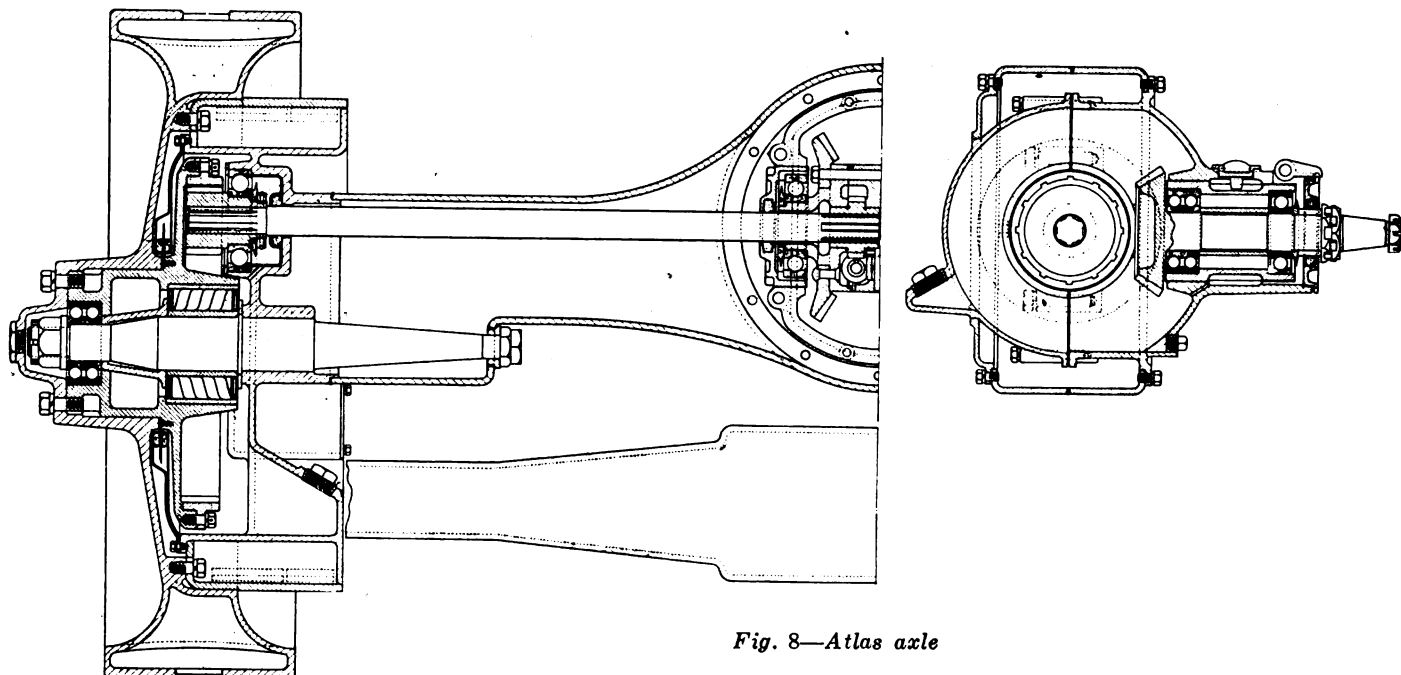


Fig. 8—Atlas axle

and to the front side of the housing is bolted a differential carrier in which are mounted both bevel gears and the differential.

The differential housing is a small simple casting only large enough to enclose the gears. The drive shafts project through the sides of the housing and are exposed between the differential housing and the brake support castings in which the pinion bearings are mounted. Both sets of brakes are of the internal, cam operated, expanding type, and are protected from dust and mud by the brake support casting. The internal gear is protected by the same casting. The mounting of the internal gear is by means of dowels or keys to hold it against rotation, with a snap ring to hold it in place inside a rim provided on the hub. A further distinctive feature of this axle is that all eight bearings used for mounting the wheels, differential and bevel pinion shaft are of the same size and interchangeable. They are of the flexible roller type.

Atlas Axle

In each of the axles previously described there has been a separate load carrying member with the driving mechanism placed either behind or in front. In the Atlas axle, shown in Fig. 8, this precedent is departed from by placing the driving mechanism above the wheel centers and making its housing of a construction suitable to carry the load imposed on the axle. In the axle shown, which is of a nominal capacity of 2-2½ tons, the housing is of pressed steel, made of two halves welded to each other and to the cast gear housing and brake carrying members at the ends. The model here shown is not yet in manufacture, but a larger size has been built with a malleable iron cast housing, the design being otherwise similar.

One distinctive feature of the Atlas design is that the differential carrier is made up as a closed housing which is inserted into the main housing with both the ordinary pilot fit at the front and a second fit where it projects from the back side of the axle housing. The drive shafts project into the axle housing at the sides through packed joints, so the oil in the differential housing is not allowed to circulate through the main axle housing.

The wheels are mounted on spindles set in bored seats in the axle housing, a combination of flexible roller and double row ball bearings being used. The cast wheels themselves are demountable from the hubs, which are of

large diameter, being held in place by a circle of cap screws outside the outer bearing and having an ample cylindrical seat on the hub. The hub cap is integral with the wheel and is provided with a large central plug for the introduction of lubricant. The wheel hub has an integral flange for mounting the internal gear.

The provision for retaining oil in the internal gear compartment is exceptional. The brake carrying casting has a seat for the pinion bearing and extends around the outside of the internal gear. Closure is made complete by a double sheet metal cover bolted to the casting at its rim. The two parts of this cover come one inside and the other outside of a thin steel disk attached to the wheel hub at the shoulder against which the wheel seats. The two halves of the cover are fitted almost completely around two felt washers between which the disk rotates, and there is a hole for draining back into the gear compartment any oil that gets past the first washer. A plug placed at the desired oil level in a conveniently inclined position inside the brake drum provides for the introduction of lubricant.

A Trussed Internal Gear Axle

An axle with elements in the same relative arrangement as the last described is shown in Fig. 9. The chief difference is that the spindle members, instead of being two separate parts attached to the ends of the housing member, are made in one piece, the diameter being reduced throughout the central portion. This member is used to sustain the tensile stress of the load carrying structure, and the housing can therefore be made light, as it has to resist only compression and the side stresses from road bumps, etc. This combination results in a structure of truss form, the compression stresses being taken in the cast housing and the tensile stresses in the steel spindle member.

The housing member is cast in one piece, which includes the pinion bearing mounting and the upper half of a flange at each end of larger diameter than the internal gear. These two flanges are completed by separate castings bolted to the housing casting, the parting being at the center line of the wheel. This parting provides for the assembling of the spindle member with the housing, a conical shoulder being used to insure the necessary initial tension in the structure. The differential carrier is bolted

to the front face of the axle housing, and a detachable cover can, of course, be provided at the back side, as in bevel gear axle practice. Details of the internal gear closure and mounting, brakes, etc., are not carefully worked out in this drawing, which was made merely to show the structural features.

The Walker Axle

For a number of years the Walker electric truck has used an axle with an electric motor mounted inside the middle of the housing in the place ordinarily occupied by the differential in a gasoline driven car. The gear reduction is obtained inside the rear double disk wheels, an internal gear of large diameter being mounted inside the wheel rim and two large idler gears carrying the drive from the central pinion to the internal gear.

An axle for gasoline driven trucks is now being made on the same principle by the Edwards Valve & Manufacturing Co. The 2-ton size of this axle is illustrated in section in Fig. 10.

The axle housing is a steel casting of proportions suitable to serve as a load carrying member, and it contains the bevel drive gears and differential at the center, concentric with the wheels. The bevel gears are mounted in a differential carrier. The road wheels are mounted on forgings, which are machined out to tubular form and fitted inside the axle housing, being held against turning by keys and clamped in place by two pinch bolts each. The axle housing extends to the inner wheel bearings, but the bearings themselves are mounted on the forgings. Between the two wheel bearings each of these forgings is developed into a spider or double bracket for mounting two idler gears. The outer end of the forging is bored out to a diameter large enough to permit the insertion of the drive pinion, which meshes with the two idler gears, and the idler gears in turn mesh with the internal gear mounted inside the cast steel wheel. The outer end of the drive shaft is not supported by the bearing, but by the idler gears, thus equalizing the tooth pressure on the two gears and on the opposite sides of the internal gear.

The inner wheel bearing is held in place between a shoulder on the forging and the end of the axle housing. The outer wheel bearing is of the same size and is retained between a second shoulder on the forging and a snap ring at the end of the forging. The bearings are of the radial ball type and each takes the wheel thrust in one direction. The idler gears are mounted on flexible roller bearings. The gear centers are in a horizontal line and the drive produces no reaction on the wheel bearings.

The road wheel is a steel casting with hollow rim section and enlarged hub, which gives it a double disk form to the diameter of the internal gear. Between the internal gear and the rim it is in the form of a single disk, to which the brake drum is bolted. The portion of the wheel in which the inner bearing is mounted is made detachable to provide for mounting the internal gear and is held in place by studs fastened through the internal gear with ends at the outer face of the wheel.

A threaded cap at the center of the outer disk makes it possible to withdraw the drive shaft and thus remove the differential without removing the road wheels. A single set of cam-operated expanding brakes is shown.

The 1½ and 2-ton White trucks have axles with double reduction gears at the center. Up to about a year ago

the larger White trucks employed chain drive, but they are now fitted with a new type of axle having one reduction at the center and a second inside the wheel hub. The construction of this axle is very closely similar to that of the Walker axle just described, the main difference being that instead of using two idler gears between the central pinion and the internal gear there is only one idler, this being placed in front of the axle center. The outer end of the drive shaft is mounted inside the hollow wheel spindle forging in two radial ball bearings, one on either side of the pinion.

In the White axle the wheel spindle forging is considerably longer than in the Walker axle, extending almost to the differential. At the inner end it is splined to prevent it from turning, and there is a packed joint to provide against oil passing from the internal gear compartment to the differential housing or vice versa. The wheels on the White truck have hollow spokes between the outside of the internal gear compartment and the rim.

The Flint Axle

The Flint axle departs still further from conventional internal gear axle construction by providing a planetary gear reduction at the wheel hub. Again the drive shaft and housing are concentric with the wheel, and a differential with a bevel gear reduction of a little over 2 to 1 is provided at the center of the axle. The drive shaft extends through to the extreme end of the axle, as in a full floating bevel gear axle, but carries a driving pinion on its end. The arrangement is shown in Fig. 11.

The wheel bearings are not mounted directly on the axle, but on a sleeve surrounding the tube, which is provided to serve as the attaching portion of a mounting flange for internal gear ring which is placed at the outer side of the wheel hub. The sleeve is keyed to the axle tube and therefore holds the internal gear stationary. The outer end of the drive shaft carries a spur pinion, and a hub cap or cover is provided, large enough to enclose the internal gear and bolted to the outer hub flange. This cover carries three equally spaced planet gears which mesh both with the central pinion and the internal gear, thus completing a planetary gear giving a 3½ to 1 reduction outside the wheel hub. The planetary gear compartment is completely enclosed and the gear operates in oil.

Both wheel bearings in this axle are of the flexible roller type, thrust washers between these bearings being provided to take the wheel thrust in both directions. Except for the larger diameter necessitated by the sleeve introduced outside the axle tube, the conditions for bearings are the same as in a bevel gear drive axle, and brake mounting conditions are also the same as in a bevel drive

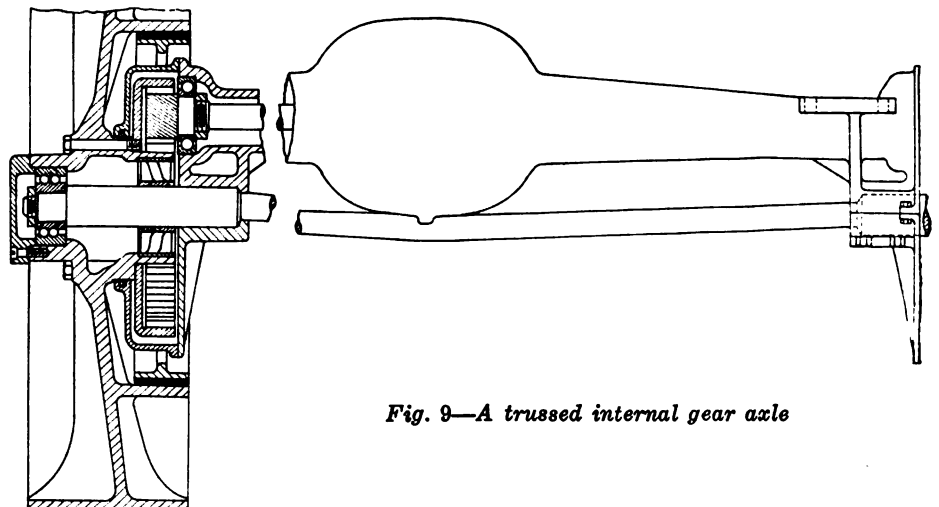


Fig. 9—A trussed internal gear axle

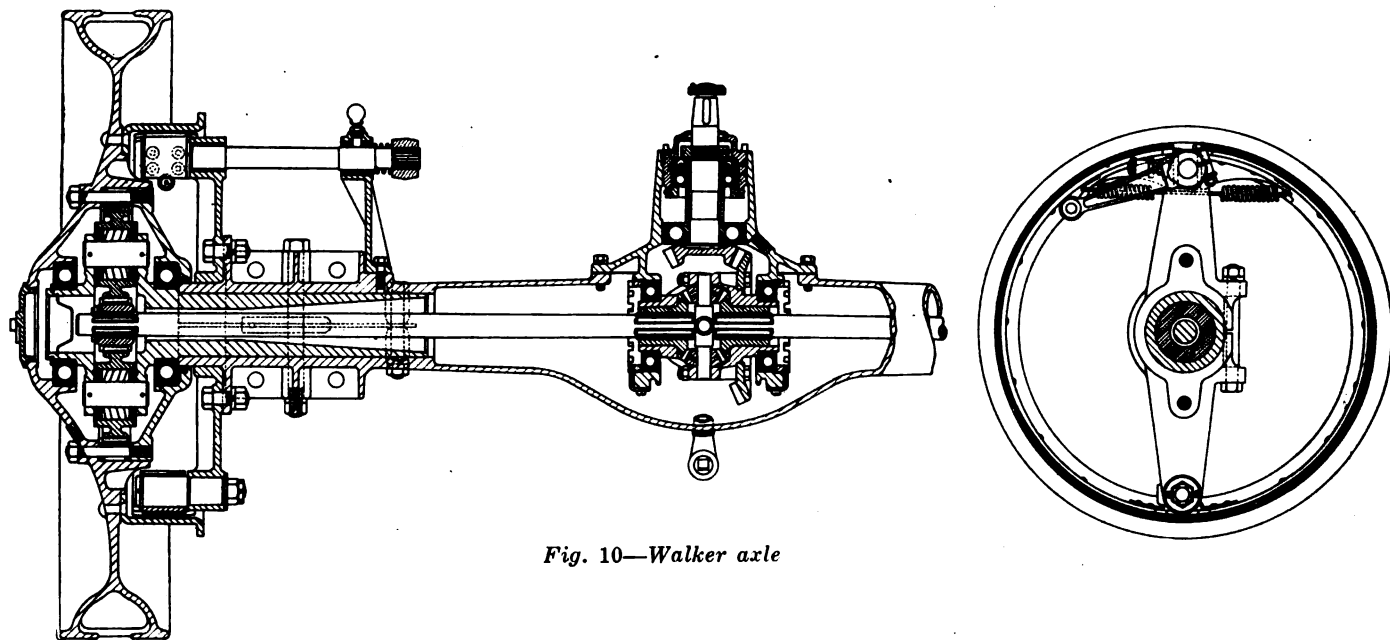


Fig. 10—Walker axle

axle. The brakes fitted in this instance are a cam operated internal brake and lever operated external brake.

Resume of Constructural Features

In the foregoing we have described a number of axles having a considerable variety of constructional features. Generally we have made no attempt to describe elements that are common to different forms of axles but have confined ourselves to the elements that are characteristic of the type of axle under consideration. This has precluded consideration of differentials and bearings at the center of the axle, these problems being so nearly the same as found in bevel gear axles. Some attention has been given to arrangement of brakes because of the interdependence of the mountings of the brakes and driving parts.

We will now consider in a comparative way a number of the more important elements of the different axles described. Of course, as in other fields of endeavor, many of the different features of construction are covered by patents that are controlled by the companies using them, so the designer is hedged in by certain restrictions.

Final Drive—Location of Pinion

Perhaps the most fundamental classification of internal gear drive axles depends upon the location of the pinion which meshes with the internal gear or the other type of final drive that is employed at the road wheel. We have found four different locations for this pinion. In one axle only, the Torbensen, the pinion is located behind the load carrying member. In most of the other axles the pinion location is in front of the load carrying member. The other two locations are directly above the center line of the wheel and concentric with the wheel, the pinion in the latter case not then meshing directly with the internal gear.

The mounting of the pinion and driving members back of the load carrying member possesses distinct advantages over the forward mounting in the way of accessibility, since it makes possible the fitting of a cover over the back of the differential housing and the inspection of the differential from the rear without extensive disassembling operations. Aside from this, it is somewhat easier to get at the driving members when they are located back of the axle. This arrangement also works out well with the mounting of the differential housing rigidly on the load carrying member, which tends to keep the drive shaft in line with the rest of the axle when deflected by load. The

main disadvantage seems to be that in forward running the driving pressure on the internal gear is upward, the reaction therefore being added to the load on the bearings of the rear wheel.

When the driving members are placed in front of the axle the gear pressure reaction is upward and relieves the bearing pressure by that much in forward running. The forward mounting also works out better in connection with the popular solid form of load supporting member. Moreover, when the drive is at the front of the axle the propeller shaft is that much shorter than when it is at the rear.

Location of the drive pinion above the wheel center is of use chiefly for structural reasons in order to use the housing of the shaft and differential in carrying the load and at the same time to allow direct meshing of the pinion with the internal gear. With the pinion either in front or in rear of the wheel center the housing is too far from the vertical plane of the load and supports to be used to advantage as a load carrier. With the pinion above the center the housing comes directly in the load plane and can be used as a load carrying member, either by making it strong enough to support the load as a hollow beam, as in the Atlas axle, or by using it as the compression member of a truss as in the trussed axle shown. Other advantages of this pinion location are that it results in an approximately straight line drive without sloping the engine, in greater ground clearance, and that any relative misalignment of pinion and internal gear due to load has less effect than in the other positions, because it results only in the teeth meshing more deeply at one end than the other, rather than a twisting of the tooth sections out of parallelism. Also the gear tooth pressure adds only slightly to the bearing pressure in either forward or backward running.

These advantages are gained at the expense of raising the top of the axle higher than in the other designs, making it necessary to place the chassis frame higher than the lowest position possible with other designs, although not high enough to interfere with having the body as low as it can be placed in view of the almost universal necessity of making the floor extend over the rear wheels.

The central location of the pinion possesses advantages in allowing the housing to be used as the load carrying member and in making easier the complete oil tight housing of the driving parts. It also avoids the frame changes that might be required with the drive above the axle

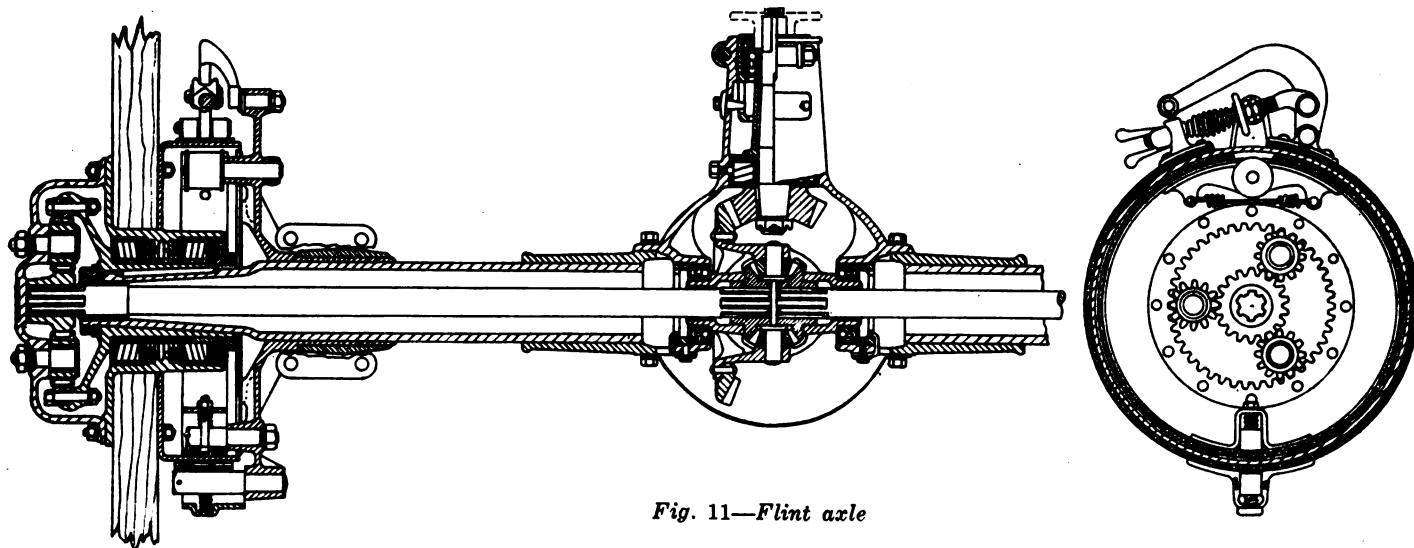


Fig. 11—Flint axle

center. However, this construction introduces the complication of one or more idler gears with additional bearings resulting in a slight loss in efficiency, while the cost is increased both by the additional gearing and by the increased wheel bearing size necessary.

A very high degree of accessibility is realized by axles having the final reduction at the outer side of the wheel hub, either according to the design shown or other design that might easily be developed. Not only can the final reduction gears be readily uncovered for inspection without removing the wheels, but the design can readily provide for withdrawing the drive shafts and inspection and removal of the differential without removing wheels or jacking up the truck. Of the possible designs of this sort the most desirable would have none of the gears attached to the cover, so the assembly could be inspected with all its parts in running position. It is also desirable to have two or more gears into which the central pinion meshes. This not only reduces pressure on the gear teeth and bearings, making possible the use of lighter gears, but it prevents the bending stresses on the drive shaft that are ordinarily set up between the point of application of the power at the pinion and the point of support at the pinion bearings, making the pressure greater at one end of the gear tooth than at the other.

Load Supporting Members

Next to the difference in structure dependent upon the location of the driving pinion, the most important structural difference in the various internal drive axles is found in the load supporting members. Apparently the most popular form of load carrying member is the solid steel bar of round section, either straight or slightly cranked at the center to avoid interference with the differential housing. From an engineering standpoint this form of load carrying member seems rather crude, but it has important advantages in cost and availability, and the evidently inferior form of the section when considered as a beam is largely neutralized by the fact that high grade alloy steel can be used without difficulty, while in the other forms of load carrying members use is generally made of cast metal or soft forging steel. Perhaps nothing makes this difference in material more striking than the practice of the Torbensen Axle Company, who use a very efficient I-beam section for their load carrying member, but in order to have a high quality steel for the wheel spindles, make these parts separate and insert them in the ends of the forging instead of forming them integral with the load carrying member.

Of course the form of beam is interdependent with

other features. Both the I-beam and the solid bar are suitable for use with the driving members either in front of the wheel center or in the rear. They can also be used with the driving members directly above, and are so used in the case of some four wheel drive vehicles, but generally when the driving members are either concentric or directly above the axle center, use is made of a hollow load carrying member which can also serve as a housing. The material may then be malleable iron, cast steel or pressed steel. Possibly cast aluminum alloy will also be available for this purpose. There is not a great amount of precedent in regard to the design of hollow load carrying members for internal gear axles, but the problem does not differ greatly from that of the worm drive axle housing, except that the smaller diameter of the differential and drive gears reduces the bulk and weight at the center of the housing. The truss form of housing makes possible the use of high grade alloy steel for the tension member of the truss, while the compression member may be of cast material, its hollow form making it suitable to resist compressive stress. This efficient use of high tensile steel for tension and of a hollow shape for compression should result in a saving in weight, especially when compared with the sound load carrying member.

Wheel Bearings

During the first few years of the use of internal gear drive axles it was thought essential that the wheel bearings should be of the parallel roller type or at least of some type which could not be misadjusted in a way that could cause a considerable looseness and thus allow the internal gear to get out of correct meshing relationship with its pinion. While most axles of this class are still made with non-adjustable bearings at the wheels, there is a marked tendency toward the use of adjustable tapered roller bearings. There seem to be three choices available: We may choose relatively small non-adjustable bearings, with the result that before the truck is otherwise worn out the rear wheels will be loose on their bearings, with resultant excessive wear and noise at the internal gear. In order to avoid this condition either large bearings may be provided, still of the non-adjustable type, or adjustable tapered roller bearings may be used. The adjustable bearings are satisfactory if adjustment is made when appreciable wear has occurred, and in any event the bearings may be readjusted if it is necessary to provide new gears, thus avoiding the expense of new bearings at the same time to prevent very rapid wear on the new gears.

A complete enclosure of the gears is evidently desir-

able for the sake of the gears themselves. It is also to be noted that in the axles where the pinion meshes directly with the internal gear and a complete enclosure is provided, it is quite impossible for dust or mud to enter the wheel bearings. The enclosure is much more effective in this respect than any dust washers that can be provided on other types of axles, and this must result in minimizing the wear of the wheel bearings.

A bearing arrangement of increasing popularity is the use of a large flexible roller bearing at the inner end of the hub, this generally being located not far from the center line of the wheel in order to carry the greater portion of the direct load. A double row ball bearing is then used at the outer end of the hub to carry the smaller radial load and the thrust load in either direction. One of the handicaps of axles having final drive at the wheel with centrally located drive shaft is the extra size of bearing which this construction makes necessary. The cost of ball and roller bearings increases rapidly with their bore, even when the load carrying capacity is not correspondingly increased.

Enclosure of Gears

One of the most essential improvements of internal gear axles that is being adopted is the enclosure of the final drive gears so they may run in a bath of oil. In the earlier axles an attempt was made to exclude dust and mud by means of a shield having a packed rubbing joint at the outer diameter of the internal gear. While this is far better than no enclosure, it is not very effective in keeping out foreign matter, and is still less effective in

retaining lubricant. The use of oil is entirely impracticable, while grease and graphite put in the internal gear soon find their way to the braking surfaces. The gears will run without lubrication but they will wear much longer and run more quietly when lubricated, and the extra cost of complete enclosure seems to be an excellent investment.

In axles having the pinion meshing directly with the internal gear enclosure of the gears involves attaching the internal gear to the wheel hub itself rather than to the spoke flange, and either the wheel itself or the flange on which the internal gear is mounted must be detachable from the hub. It is desirable to make the diameter of the hub as small as possible between the internal gear and the spokes in order to provide an ample oil well into which the gear may dip without bringing the oil level too close to the lowest point at which direct oil leakage can occur. It is not easy to provide a thoroughly satisfactory oil seal in the limited space available between the gear and the spokes, especially when the diameter of the joint is so large. One thing that should be borne in mind is that oil throwing devices should be so arranged that the oil will not only be returned to the reservoir when rotating parts are turning at high speed, but also when they are standing still or rotating very slowly. The simple felt washer can hardly be depended upon to permanently prevent passage of oil, especially in view of the wear to which it is subjected by the large diameter and consequent relatively high rubbing speed at this point. There should be an arrangement of oil throwing washers, with or without felt washers in addition.

American Machine Tools Abroad

A MERICAN machine tools played a prominent part in the machine tool exhibition held at Olympia during the month of September. This exhibition was the second held by the Machine Tool Trades Association in England, the first having been in 1912. Commenting on the exhibition, the British engineering journal, *Engineering Production*, states that "in consequence of taking over numerous American patents, this industry stands to-day technically at its zenith."

The London *Times Engineering Supplement* for September makes the bold statement that "the general and detail design, the workmanship and finish of British tools have been so much improved that the products of this country (England) now lead the world." A more detailed examination of the exhibits and the prominence of standard American lines, exhibited by British merchant firms, fails to bear out that statement, while the quotation from the engineering paper cited above indicates that to America's machine tool builders must be attributed much of the excellence of the machines now on the British market.

A detailed description of the exhibits reveals the following American products in prominence:

Cincinnati planer
Cincinnati Bickford radial and vertical drills
Bausch multiple spindle drill
Pond Tool Co. boring machine
Bullard vertical boring machine
Acme flat turret lathe
Gisholt 20-in. lathe
Warner & Swasey turret lathes
Potter and Johnson semi-automatics
Gridley turret lathes
Cleveland automatic shaft machine
Milwaukee vertical milling machine
Milwaukee universal milling machine

Cincinnati No. 5 milling machine
Leblond universal milling machines
Becker two-spindle vertical milling machine
Kemp Smith universal milling machine
Van Norman duplex miller
Ingersoll 48 in. double-spindle vertical miller with rotary table
Ohio 40 in. tilted rotary miller
Potter & Johnson millers
Gould & Eberhardt gear-cutting machines
Gould & Eberhardt gear-hobbing machine
Fellows gear shapers (external and internal machines)
Landis plain and camshaft grinders
Ohio tool and universal grinders
Blanchard surface grinder
Norton plain grinding machine
Norton universal grinder
Heald internal grinder
Heald cylinder grinder
Lapointe duplex cutting-off machine

Machine tools from America, Switzerland, and Sweden participated in the exhibition as well as those from Great Britain. German machines were excluded, probably through fear of German competition. That the feeling in England runs rather high on this question is indicated by this statement from *Engineering Production*: "How far these efforts at exclusion in this industry against Germany may go, may be seen from the fact that the manufacturers belonging to the association have bound themselves to refuse delivery to any trader who deals in German machines."

The large part played by American machine tools in this important exhibition is of special interest at this time when machine tool development is being regarded as the chief factor in reducing unit production costs abroad as well as in this country.

A New Attachment for Grinding of Cams

The development of the automobile engine has brought many demands from engineers for the accurate grinding of cams, some of which are necessarily of the most difficult shapes. Production managers have added that this work be done speedily and without much additional machinery.

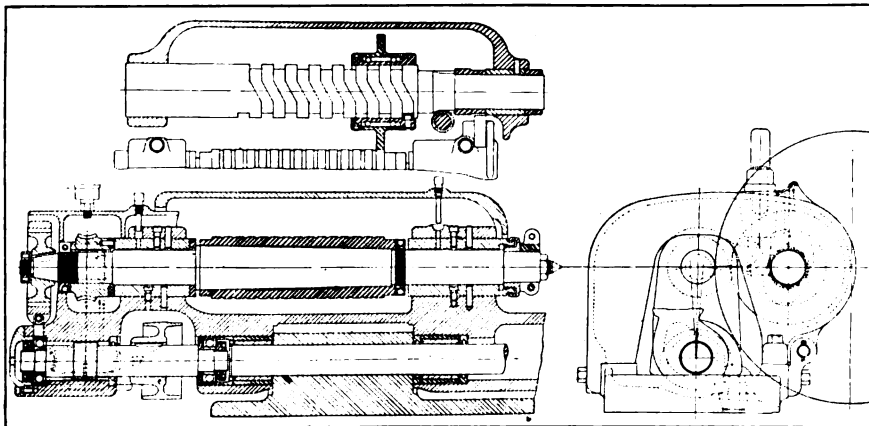
IN the development of the automobile engine to its present high point of efficiency, the camshaft has received much attention. Automobile engineers have long recognized the importance of accurately reproducing cam shapes. In designing cams of various shapes, the tolerance has gradually been reduced, so that grinding machines are required to produce many of the most difficult shapes, to meet the requirements of accuracy. In order to obtain a silent cam, clearances have been reduced, and at the opening and closing points in some cases, there is a slight rise in a number of degrees; for example, 0.005 in. in from 20 to 25 deg.

The present cam requirements have been responsible for the development of the new Landis attachment shown here. The manufacturer's aim has been to make it possible to grind cams accurately and quickly but he has not overlooked the importance of good finish. Rigidity is one of the outstanding features of the new underslung cam grinding attachment. The swinging

bracket is tubular in cross section and is well supported directly under the master cam and work centers close to the machine bed. This construction balances the swinging bracket, eliminating all strain.

The work being carried directly over the fulcrum center, reduces the vertical movement and grinding contact

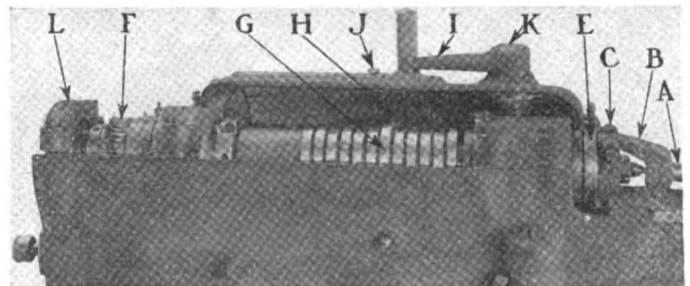
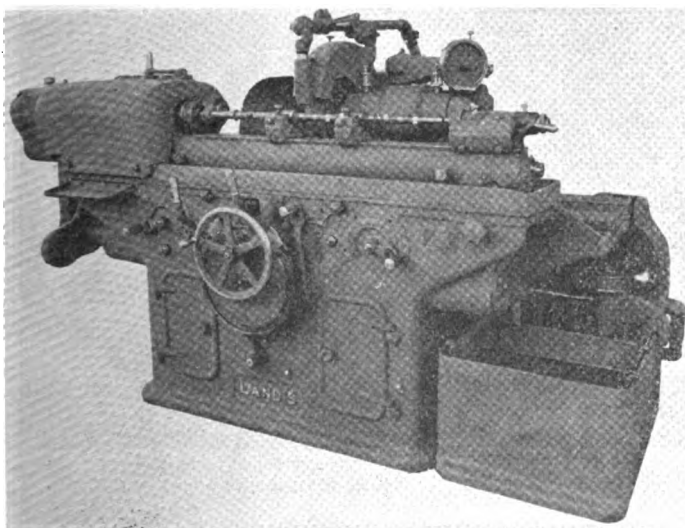
from changing over the periphery of the wheel, thus cutting down to a minimum the difference in contour of cams caused by the changing diameter of the grinding wheel. The master cam being mounted directly on the headstock spindle, substantially connected and in line with the work, is claimed to eliminate lost motion and errors. The master cam is kept in contact with the



Sectional view of Landis cam grinding attachment

master cam roller by means of compression springs, the tension being adjustable to suit different conditions.

Accurate work is secured when the grinding wheel is of a diameter equal to that of the roller used in contact with the model cam when generating the master. This condition is caused by the contact between the work and



On left—Landis plain, self-contained grinding machine with new cam grinding attachment. Above—Detail view of Landis grinder attachment for grinding the camshafts of multi-cylinder engines

grinding wheel traveling above and below the wheel center. The more the grinding contact varies from the wheel center, the more pronounced the variation in the contour of the cams ground with different sized wheels. As the work is being swung equal distances from a point directly over the fulcrum center, the movement of the work is practically in a horizontal plane, reducing to a minimum the travel of the grinding contact above and below the wheel center.

The accompanying photographs show the attachment mounted on the Landis 10 in. plain self-contained machine. The camshaft A is driven by dog B which in turn is driven by driver C mounted on spindle E, and is adjustable to facilitate setting of the camshaft in proper relation to the master cam. On this spindle is worm wheel F, the spindle being worm driven throughout. On spindle E is master cam G which is made from solid steel

and mounted on the spindle by means of a taper and nut. In contact with the master cam is roller H which is moved from cam to cam by means of lever I. The relative position of the roller is indicated by pointer J. By means of a cam on shaft K, the roller and master are disengaged by a half turn of lever I and the roller is shifted to the next cam by completing the turn. Thus, the roller and master cam are disengaged and the roller is shifted to the proper position by a single movement. On the spindle is also placed the brake L, its object being to compensate for any lost motion which would be reflected on the cam as the pressure is reversed when passing over the nose.

This new cam grinding attachment can be furnished in three sizes, viz., $5\frac{1}{2} \times 26\frac{1}{2}$ in., $5\frac{1}{2} \times 36$ in. and $5\frac{1}{2} \times 52$ in. This takes care of camshafts of all the usual lengths.

Motor Sleigh Attachment

DURING the past three winters there has been an unusually heavy snowfall in the vicinity of New York, and last winter traffic was practically suspended for several weeks. A great loss to business resulted, and the community was stirred to a realization of the need for preparedness to meet snow conditions.

One way of solving the snow problem is to provide equipment for the prompt removal of the snow, and another is to adapt automobiles so as to render them capable of operating in moderately heavy snow.

Jacob Rantasa of Vienna has been working along the latter line. Mr. Rantasa's early efforts were directed toward building a complete motor sleigh from the ground up, but he soon came to the conclusion that a machine of this type would be as expensive to build as an automobile, and he then turned his attention to conversion units by means of which it would be possible to convert any ordinary automobile into a motor sleigh.

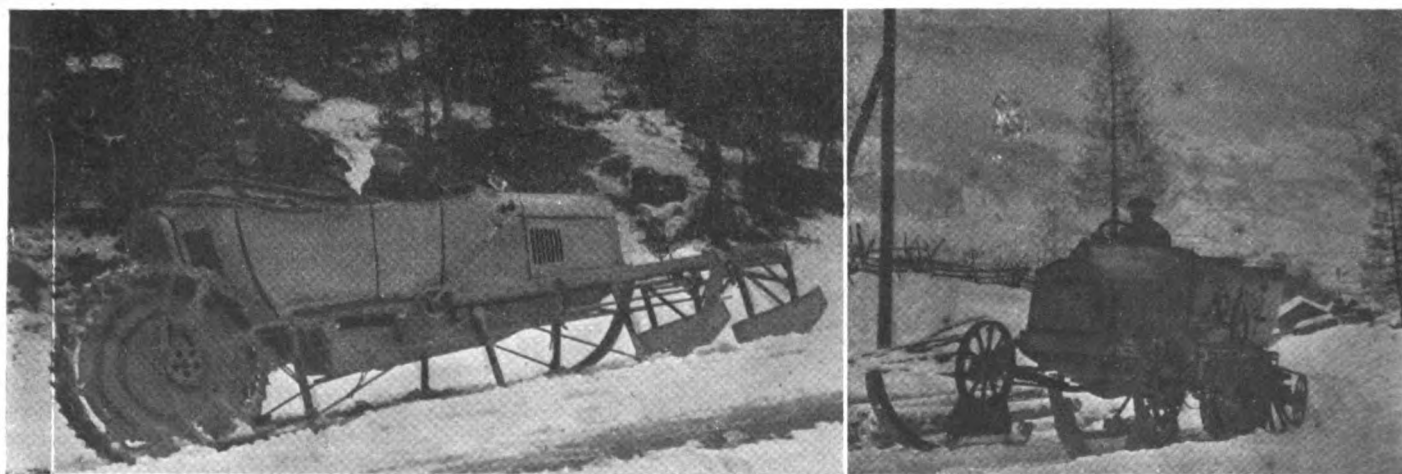
The attachment or converting unit is known as the Aquilon, and two photographs showing it applied to different types of cars are reproduced herewith. Mr. Rantasa claims that automobiles equipped with this sleigh attachment are capable of transporting heavy loads over roads deeply covered with snow or ice and may even pull several loaded trailers on runners behind.

The sleigh attachment was first designed during the summer of 1914, but owing to the war it was impossible to get it built in Austria during the next few years. In

December, 1917, it was submitted to Major-General Groener in Berlin, who had charge of the testing department of the German Army Transport Corps. We understand that a favorable report on it was made by a committee of experts and that as a result it was decided to build a model, but owing to the scarcity of raw materials the work was greatly delayed.

Mr. Rantasa also informs us that the Swiss Postmaster-General is at present negotiating for the equipment with this device of mail automobiles on several lines in Switzerland. Many of these lines extend through mountainous territory, and it has been found necessary to resort to horses at the beginning of December and continue their use until about April 1.

With the Aquilon system the front wheels are placed on suitably sized runners, while the rear wheels are taken off and in addition to the rear runners suitable levers are put on which carry the flexible and universally mounted driving member, which thus may adapt itself to uneven roads. In case of very deep snow the driving member can be pressed down from the driver's seat, which enables enough adhesion to be obtained to ascend even considerable grades. The transmission of power to the rear axle is the same as in the automobile, and from the rear axle the drive is by means of chains. For passenger cars the driving member consists of a drum provided with suitable traction devices, whereas for motor trucks it is made of the chain track type.



Automobiles with Rantasa sleigh attachment being tried out in Austrian mountains

Training Apprentices for Permanent Jobs

The training course for machinists described here has been operated without cessation for nearly forty years. It does more than turn out skilled machinists. Many executives of the organization got their start through this course. The methods used are discussed, along with past results.

By Norman G. Shidle

EVEN when business conditions are temporarily such as to make improbable the immediate installation of new industrial training work, the methods and practice of the apprentice course conducted by a Cleveland concern for forty years without interruption are of interest. Beginning work as apprentices themselves, the founders of the Warner & Swasey Co. instituted apprentice training work along with the beginnings of their manufacturing organization forty years ago.

Since that time constant and gradual development has taken place in this course, but whether times were good or bad, it has never ceased to function. That fact in itself is a pertinent commentary upon the value of such work from the standpoint of the management of this concern. The course has grown to considerable proportions, and now includes not only actual training in the shop, but also a regular school in which the apprentices are given classroom instruction.

The classroom instruction is closely tied up with the shop work, but both are conducted in such a way as to make the graduate apprentice of maximum ultimate value to the firm, rather than to obtain from him the highest production in a given line at the earliest possible moment. This idea is illustrated by the statement made recently by Frank A. Scott, vice-president of the Warner & Swasey Co. In speaking of the future of the company, as compared with its successful past, he said, "The apprentice school has supplied the renewals needed within the body that has supported it, and has made liberal contributions of trained and talented men to the metal working industry generally."

Majority of Executives Are Graduates of Course

An examination of the list of executives bears out this statement; the majority of them are graduates of the apprentice training course. This ultimate purpose is kept in view throughout the training of apprentices and the methods used have met with marked success. Since the actual training in the shop is somewhat similar to that already described by AUTOMOTIVE INDUSTRIES in the story of the Ford practice, that phase of the Warner & Swasey work need not be dealt with in as great detail. The school work at this plant presents some novel features worthy of special attention. Since the school and shop work are very closely related, however, it would not be practicable to describe them separately.

The apprentice machinists' course at this plant lasts four years, and is open to any boy between the ages of sixteen and twenty-one years who can fulfill certain requirements for admission. It is not necessary that the boy be employed at this factory before starting his training course. He may be hired and begin his apprentice

work at once. The school and shop work are both so regulated that a boy can begin his course at any time during the year. Thus one or two boys are starting every week and one or two others are being graduated.

The following excerpt from the "Conditions of Apprenticeship," listed on the first page of the apprenticeship papers which each boy signs at the beginning of his course, gives in brief and clear form the essential information concerning the apprentice work.

Requirements: The applicant for apprenticeship to the machinist's trade must be not less than sixteen nor more than twenty years of age. He must be physically sound, of good habits and character, and must have received an education equivalent, at least, to that required for graduation from the eighth grade of the Cleveland schools.

Application and Agreement: The candidate must apply in person, and pass an examination under the direction of the superintendent. If his application is considered favorably, he will later be notified to begin work, subject to the rules and regulations governing the employees of the Warner & Swasey Co., and, in order that his fitness for the machinist's trade may be rightly judged, the first 1250 hours (about six months) of his service shall be considered as a trial term, which, however, may be terminated at any time less than 1250 hours if it is found that he is not well qualified for the work. During this trial period, report of the applicant's progress and general deportment shall be made to the superintendent on the first day of each month. If at the expiration of the trial term the applicant shall be found to be satisfactory, he shall be engaged as a regular apprentice, after he and his parents or guardian shall have signed, in duplicate, the within accompanying *Agreement* (one copy being retained by the Warner & Swasey Co., and the other by the parent or guardian), and the 1250 hours which he has already served shall apply on the total number of hours required for his apprenticeship.

Time and Compensation: The time of apprenticeship shall consist of four terms or periods of 2500 working hours each, and the rate of wages per hour for the respective periods shall be as follows: for the *first* 1250 hours, 25 cents per hour; for the *second*, 27½ cents per hour; *third*, 30 cents; *fourth*, 32½ cents; *fifth*, 35 cents; *sixth*, 37½ cents; *seventh*, 40 cents; and the *eighth*, 42½ cents per hour.

Each apprentice, upon satisfactorily completing the four terms, shall receive from the Warner & Swasey Co. a gratuity of one hundred dollars (\$100.00), a graduate apprentice pin, and a certificate of apprenticeship signed by the Warner & Swasey Co.

General Conditions: During the entire term of apprenticeship written reports of the workmanship, fitness and deportment of each apprentice, together with recommendations as to his future work, shall be made to the superintendent on the first days of January, April, July and October of each year.

It will be the endeavor of the Warner & Swasey Co. to give each apprentice, as far as possible, an opportunity to acquire a practical knowledge of the machinist's trade, and it is expected that the apprentice will manifest evidence of ambition, not only by faithful and diligent work in the shop, but by the improve-

ment of his leisure time at home in study and in the reading of such mechanical and engineering papers and other literature as will enable him to master theoretical as well as practical problems, thus fitting himself to hold positions of usefulness and responsibility.

The Warner & Swasey Co. reserves the right, at its sole discretion, to terminate this agreement with any apprentice for any of the following reasons: non-conformity to the rules and regulations of the shop; want of industry or capacity; indifference to duties; or improper conduct within or without the shop.

Each week includes 49 hours of work, 45 in the shop and four in the classroom. Both the work in the shop and that in the classroom is systematized along definite lines. Every attempt is made to correlate the two branches, but this is done in a general rather than a specific manner. The chief connecting link between the school and shop is the apprentice instructor. There is one such instructor for the 63 men who comprise the average number of apprentices.

The duty of this instructor is to visit the apprentices each day in the shop and supplement the work of the foreman in instructing them. Thus he brings together their classroom knowledge with their actual work, and in a general way functions as a practical connecting link between the school and the shop. His work follows, in a general way, that of the one full-time instructor at the Ford plant, referred to in a recent article.

In the shop an apprentice is given an opportunity to learn the operation of a number of machines. He is moved from one machine to another under a systematic schedule. The amount of time spent by each boy on each machine will vary slightly in accordance with the ability of the boy and the line of work for which he seems specially adapted. The following list presents in a general way, the various machines upon which each of the apprentices is trained and the amount of time spent on each machine:

1. Planing and boring mill.....6 months
2. Milling machine.....6 months
3. Drilling machine3 months
4. Grinding machine3 months
5. Jobbing—bench work4 months
6. Turret lathe6 months
7. Engine lathe6 months
8. Small tool department.....3 months
9. Collet work3 months
10. Tool room6-12 months
11. Assembly4 months
12. Fitting4 months
13. Drafting room3 months

It will be seen at a glance that the total months in this column exceed four years, but as noted previously, some of the work is not taken by every boy. The small tool and collet work, for instance, is not taken by every apprentice, while the drafting room work is optional in certain cases as well. In giving the instruction on the turret lathe, special attention is given to making the apprentice thoroughly familiar with the company's own lathe. The apprentice may later be a salesman.

The school work, while it embraces only four hours a week, is a very important part of the apprentice instruction. Classes are conducted in a regulation school house with the familiar classrooms and blackboards.

The boys are grouped in a number of classes, so that each group is comparatively small. Thus the classroom instruction, though short in time, can be intensive in application.

The classes are, of course, divided according to the year in which the various students are working; that is, the first year boys are grouped together, the second year boys together, etc. But in addition to this usual grouping, a further grouping is made of those boys who are

Apprentice School—1919-20					
September 15, 1919					
MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
2nd Year 2a Shop Practice Free Hand Drawing Geometrical Drawing Practical Algebra Shop English Trigonometry	2b Shop Practice Drafting Room Practice Practical Algebra Shop English	2c Shop Tools & Machines Drafting Room Practice Shop Mathe- matics Shop English Algebra Shop Practice	2a Shop Practice Free Hand Drawing Geometrical Drawing Practical Algebra Shop English Trigonometry	2b Shop Practice Drafting Room Practice Practical Algebra Shop English	2c Shop Tools & Machines Drafting Room Practice Shop Mathe- matics Shop English Algebra Shop Practice
Senior Year Sa Machine Design Strength Ma- terials Shop Organi- zation Buying & Selling	Sb Drafting Steam Mechanics— Heat Trigonometry		Sa Machine Design Strength Ma- terials Shop Organi- zation Buying & Selling	Sb Drafting Mechanics Trigonometry	
First Year 1a Shop Tools & Machinery Drafting Room Practice Shop Mathe- matics Shop Spelling & Description Practical Algebra	1b Shop Tools & Machinery Drafting Room Practice Shop Mathe- matics Shop Spelling & Description Algebra		1a Shop Tools & Machinery Drafting Room Practice Shop Mathe- matics Shop Spelling & Description Algebra	1b Shop Tools & Machinery Drafting Room Practice Shop Mathe- matics Shop Spelling & Description Algebra	
Junior Year Ja Geometrical Drawing Mechanics— Heat Trigonometry	Jb Geometrical Drawing Mechanics— Heat Trigonometry		Ja Geometrical Drawing Mechanics— Heat Trigonometry	Jb Geometrical Drawing Mechanics— Heat Trigonometry	

Fig. 1

particularly bright and those who are slower to learn than the average. By making this division, the boys who learn more rapidly are not held back by those who cannot grasp the subject quickly. This practice is important in allowing the apprentice to gain the utmost value from his few hours of classroom work.

Each of the classes lasts one hour at a time, the entire work of instructing being carried on by two men. The classroom work embraces a variety of subjects, chief among which are the following:

1. Practical arithmetic
2. Algebra
3. Trigonometry
4. Mechanical Drawing
5. Machine Designing
6. Physics
7. Chemistry
8. Structure of metals
9. Business English
10. Shop Practice
11. Strength of Materials

The two instructors conduct all these courses, with the exception of that in Shop Practice. This is taught by the apprentice instructor. Careful scheduling is necessary, since the classes are small and the subjects numerous. The schedule of classes shown in Fig. 1 illustrates how the problem was worked out last year. The schedule in vogue at the present time differs only slightly in detail.

A boy is not permitted to complete the course if he shows himself unfitted to do the work successfully. The first six months constitute a probation period. At the end of this time nearly every incapable boy is dropped. The "death rate" among those who survive the probation period is very small.

While the school work follows the lines of the regular public school in some ways, the methods and purpose of the instruction are rather different.

The classes get under way very quickly after the pupils have assembled. In this respect they are far ahead of the regular school. The instruction begins immediately after the bell rings, and the instructor gets into the heart of the lesson without preliminaries or delay.

Emphasis is laid upon speed as well as upon accuracy, although both are strongly stressed. This is an excellent feature, however, since both speed and accuracy are necessary for successful shop work.

When a student is found taking too long on a set of algebra problems, for instance, the teacher tells him that there must be something the matter with the method he is using. When a boy needs half an hour to work out a problem that should take him fifteen minutes, it is not enough that he should finally have obtained the correct answer. Special attention is given in such a case to investigating the method used, so that the boy will learn to do things quickly as well as accurately.

A great deal of time is given to drawing and drafting work, since this forms a necessary foundation for much of the practical work which the apprentice must do. Near the beginning of his course he is given instruction in drafting, especially along the lines used by the Warner & Swasey drafting rooms. Thus he immediately becomes familiar with the methods of numbering, lettering, etc., used on all of the blue-prints which he is called upon to read in his shop work.

This idea is well expressed in the foreword to the booklet on "Shop Drawings" which is used in connection with the work of this school. This foreword reads in part: "In a study of machine drafting, the apprentice must first learn to read and write 'the language of the industries.' Further than that he must learn the best commercial practice in making working shop drawings and the particular system of his own employers. In doing this he must be exceedingly exact in his work and learn to use his constructive imagination."

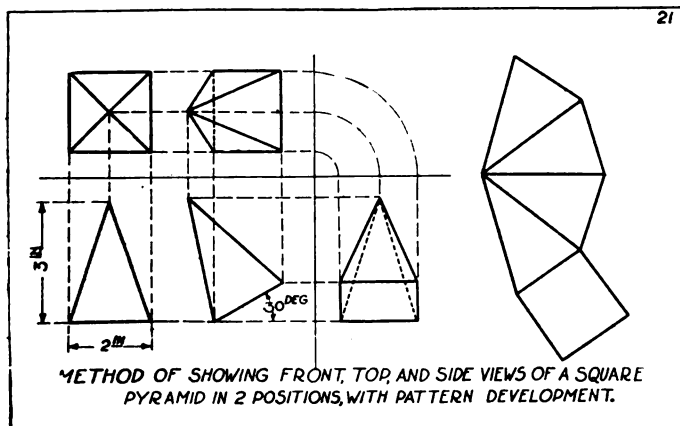


Fig. 2

In this course, considered one of the most important, a number of working drawings are given to the student. He is required to copy them and to work out certain problems concerning them. Problem 15 in this course, for instance, is as follows:

Views of a Pyramid

Study the views and development shown in the drawing (Fig. 2). Make similar views of another pyramid with a $\frac{3}{4}$ -in. square base and $2\frac{1}{4}$ in. high. Show it tilted up 15 deg. instead of 30 deg., and also show development.

In line with this policy of emphasizing the importance of drawing, is the method used to teach geometry. It is not always easy to teach geometry to boys of this type

by the usual logical method. Consequently, the approach to geometry is made through a course in sketching and free hand drawing. This course follows that in drafting just described.

In this course, the different forms of drawing are illustrated, and after the principles have been mastered by the apprentice, they are applied in free hand sketching with a view to developing neatness, speed, and accuracy. Through this course, the apprentice becomes familiar with the isometric, oblique, axometric, and dimetric projections, learns something of the third dimension, and

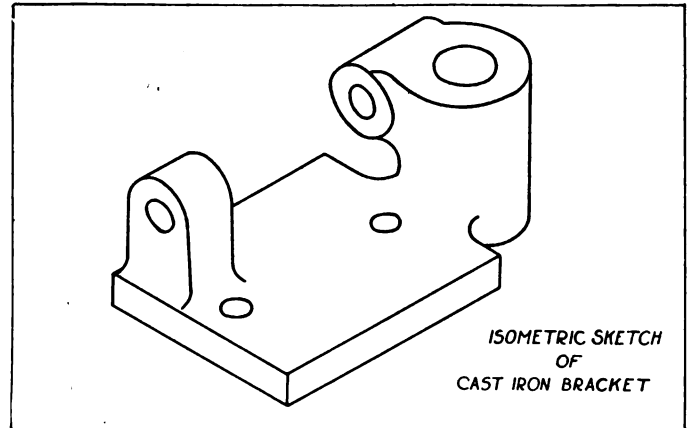


Fig. 3

is thus led some distance into the realm of geometry before he has a suspicion of where he is.

From this point it is not difficult to lead him into the more difficult theory of geometry. The method is especially adaptable to teaching boys of this kind, whose mind, by training and experience, can more easily grasp the concrete details of sketching and free hand drawing than the more abstract geometric theorems. Fig. 3 illustrates one of the drawings used in this course.

The course at the Warner & Swasey Co. is of peculiar interest not only because of its several novel methods, but because it differs in purpose from the other training courses thus far described in AUTOMOTIVE INDUSTRIES.

While in one sense the aim is extremely practical, the entire school and shop training is conducted on a very broad principle. The ultimate maximum value of the apprentice is given more attention than immediate production needs. Every effort is made to have the boy broaden his outlook, extend his knowledge, and learn enough to get ahead in later years.

In various ways, the company says to the apprentice, "Better jobs are always waiting for the man who does his work just a little bit better than the man next door." Then the apprentice has but to glance through the company organization to find ample proof that the statement is made in good faith and carried out in actual practice.

The organization holds a good percentage of those men in whom it invests as apprentices, but even those who go elsewhere to work are not counted as bad investments. A man is given valuable training for many things in this course, and when he goes out from it is counted as an asset for Warner & Swasey wherever he may be working. And many examples are cited in which such "bread cast upon the waters" has come back buttered.

Forty-two men have been graduated from the apprentice school during the last five years. Twenty-nine of them are working for Warner & Swasey. Few manu-

(Continued on page 929)

How to Advertise the Technical Product Effectively

The chief faults of current technical advertising, together with clear and authoritative methods of doing the job right, are effectively presented in a recently published book. The following digest of that volume contains information of immense importance to every executive just at this time.

NEVER in the history of the automotive industry has the intelligent expenditure of money in technical advertising assumed so vital an importance. Not to advertise is likely to mean stagnation for a business, while faulty, uneconomical advertising may result in enough wasted money to make a serious financial drain upon the company.

Because of the inherent power of technical advertising and because of the present necessity for utilizing it in the most effective and economical manner, the book just published by McGraw-Hill entitled "Advertising the Technical Product," is of vital interest to manufacturers. The volume is written by Clifford A. Sloan and James D. Mooney. Mr. Sloan was formerly advertising manager of the Hyatt Roller Bearing Company, while Mr. Mooney is of the vice-president's staff, General Motors Corporation.

The subject is treated in detail and is discussed in an extremely practical manner, so that it contains much valuable information for immediate use by the automotive manufacturer. Because of that fact, it is worthy of a review more extended than usual. The opinions expressed are frank and come from men who have had experience in advertising technical products.

In concise tabular form, the authors present a clear and forceful résumé of the chief economic losses which exist in the present day advertising of technical products. This digest is worth the careful study of every executive

I. Losses due to the manufacturer or his advertising department caused by:

1. Lack of analysis:
 - (a) of product for best selling points;
 - (b) of component markets;
 - (c) of the relation of the product to the respective markets; to supply material for the most powerful appeals;
 - (d) of all the mediums available for carrying the message, and the possibilities of co-ordinating the use of several of these to establish a complete campaign;
 - (e) of the costs of advertising, and the results produced, to provide a basis for spending further money more effectively.
2. Too much attention focused on the product instead of on the service it performs.
3. Too little use of the dollars and cents appeal. This appeal is one of the strongest used in advertising general commodities. It is one of the oldest and most powerful appeals used in selling anything. The money appeal has been used very little in selling technical products but it presents very interesting possibilities.
4. Lack of knowledge of the psychology of the technical or professional buyers in the component markets.
5. Advertising in territories or to component markets

for which no arrangements have been made for selling or distribution.

6. Lack of understanding of correct organization principles to insure effective work in the advertising department. The advertising departments of many large manufacturers specialize entirely on the functions peculiar to the execution of advertising detail and routine, such as copy, illustration, art work, type, but specialize not at all on the problems peculiar to selling the product or products to component markets for these products.
 - This condition or organization is the cause of the appearance of such a great proportion of blanket appeal advertising, good advertising in form and appearance but almost powerless in sales energy.
 7. Lack of sufficient contact between the advertising department and the field men. Too little observation in the field by members of advertising department.
 8. Lack of sales ammunition, of sales substance as a basis for building the messages.
 9. Lack of the carefully planned campaign, of which every message should be a part.
 10. Poor choice of medium or mediums for delivering the messages.
 11. Lack of perception of the distinction of character of magazines, as expressed in their purposes, fields and editorial services.
 12. Lack of follow-up, of sales-clinching messages to establish the value of the general advertising by bringing in the volume.
 13. Poor execution of direct mail; poor grade of mail pieces; faulty lists.
 14. Liberal and costly use of expensive space in popular magazines for indirect methods of advertising, without a balancing amount of time and money spent on the kinds of advertising that will clinch sales.
 15. "Dominating" advertising campaigns. It is possible for a manufacturer to dominate the market for a technical product, but not as the result of one big "smashing" campaign in a popular magazine.
 16. The use of house organs that express too much "house ego."
- ## II. Losses due to the mediums, caused by:
1. The reduction of some trade and technical magazines to the category of directories, because of the great masses of advertising carried by individual issues.
 2. The lack of some means of getting the reader over into the advertising sections of the trade or technical magazines, some such means as the interpolation of editorial material with the advertising.
 3. "Special issues" of trade or technical magazines.
 4. Too many issues per year of magazines with little news.
- ## III. Losses due to the manufacturer's counselors, caused by:
1. The scarcity of counselors who are disinterested. The manufacturer's counselors are made up of two principal groups, the national advertising agencies

and the advertising service departments of the trade and technical magazines. There is a third very small group made up of the "technical agencies"; they are more truly disinterested parties, but so far their influence in technical advertising is very limited. The national agencies, of course, are interested in the promotion of advertising in the popular magazines because their commissions from these sources are income for them. The advertising service departments of the trade or technical journals are interested in the promotion of advertising in their own particular magazines. It seems hardly accidental, therefore, that advertising should be highly developed in these two directions. Nor is it strange that the direct forms of following up the magazine advertising that concentrate directly upon crystallizing the sale have been developed slowly and at present get very little of the attention they deserve; there is a lack of organized effort to promote the use of such advertising; it is nobody's child.

2. The general lack of experience and knowledge of marketing technical products, in the national agencies that give counsel to the manufacturer on advertising in the popular mediums. There is a lack of adaptation of the principles of advertising to fit the conditions peculiar in general to advertising technical products and in particular to advertising the particular technical product to its component markets.
3. The making of the appeal in popular mediums to the average reader instead of to the average prospect-reader.
4. The specialization of many of the large advertising agencies entirely on the functions related to the physical factors of building advertisements instead of the specialization on the individual products and their respective component markets."

Possibly the most important point brought out is that "Of course the treatment of the presentation of the message, the illustrations, the copy will be varied to harmonize with the character of every one of the publications in which the advertising is to appear." Again and again is this statement emphasized in one way and another. It is shown that the same copy run in various publications without particular reference to the interests of their subscribers is money thrown away. Even though the preparation of a special advertisement for a particular business paper may seem high in proportion to the comparatively small space cost, such specialization is profitable; in fact, lack of specialization renders the advertising almost wholly ineffective.

In determining the kind of copy which can effectively be used in a particular publication, the editorial matter of that paper will offer valuable suggestions. "Every technical advertisement should be directed to a well defined group of buyers. The solution of the specialized problems of the buyers in this group is essentially the basis for the editorial contents of the particular paper. Consequently, if the editor of the paper has really sensed the problems of his industry, the advertiser will find the right way to reach the readers of that publication by studying just what the editor does to reach them.

"In the past, advertisers have been inclined to look upon technical and industrial and business papers as a whole as 'trade papers.' They have lumped all sorts of papers under this general heading and have not realized that in the field of technical journalism there are cleaner-cut lines of editorial appeal than are to be found in any other class of publishing."

This quotation is followed by a discussion of the editor's leadership in moulding opinion with regard to the

trade conditions of the industry, and how it is possible to make the advertising help get something done. "It is the editor's function to make his industry conscious of new problems, to lead it in the development of better methods and better practice. The value and strength of a journal as an advertising medium may often be judged by its relation to its field in this respect. . . .

"The advertising section (of a business paper) may be considered as a multi-page coupon, each page of which is signed by an advertiser, who tells how his particular product answers the problems whose general solution has been suggested in the editorial pages."

Some very frank and practical statements are made concerning the relative value of the technical and the popular magazine as a medium for advertising technical products. In regard to the former, the authors have this to say:

"Advertisers seemingly are not conscious of the possibilities of the use of large units of space in the technical or trade magazines as a means of dominating their markets. . . . He can combine the force of his mass, which accomplishes publicity, with the directness of his appeal, which accomplishes sales."

As regards technical advertising in popular magazines, the writers are less enthusiastic. Their discussion of the advisability of such advertising is summed up as in the following quotation:

"It would be very foolish to say, finally, that advertising technical products in national magazines cannot be made economical and profitable. But at the present time there certainly is little proof available of its having been made generally economical."

The chapter on "The Publishers Service Department" is of particular interest. After having discussed the general agency, the company advertising department, etc., as sources of technical advertising work, a critical study and estimate of the publishers' advertising department is given. Some of the authors' conclusions follow:

"This department (the publishers' service department) has been studied by the authors, and they can report sincerely that in these days when so much service is advertised that is not conscientiously backed up, it was refreshing to find a well organized group of men who know just what they are doing and who are doing it thoroughly. . . .

"This service department has taken an important step . . . in the elimination of the wasteful use of good space for generalized appeals of low sales energy.

"It is possible for technical advertisers to secure from service departments complete sales plans, campaigns, analyses of trade conditions and advertising suggestions in any quantity submitted to them for approval. Also it is possible for these same technical advertisers to secure the close co-operation of the technical advertising writer in the service department who is the contact man on the case.

"After all, advertising service departments are merely one expression of how the technical publishers of to-day are serving their field."

A brief review can give only a few of the most significant points embodied in the book. Since the volume has been written by two men who have had many years of hard practical experience in attempting to get results in the technical advertising field, the statements made gain an added weight. The book will be of more or less interest and value to every executive in automotive concerns; to some it will be of vital importance.

Landing Fields Are a Major Problem in Development of Air Traffic

More air ports must be provided if air travel is to be stimulated. Heavy commercial machines will require better equipped landing fields than the light planes now most common. The following article tells briefly what the situation is and records some methods suggested for improvement.

THE immediate future of commercial aviation is closely tied up with the development of more air ports and the improvement of those already in existence. It is obvious that very definite limits appear for the growth of air traffic, unless landing fields can be greatly increased in number throughout the country. A survey of the situation as it exists to-day indicates that plans for improvement and refinement of conditions in landing fields have progressed much more rapidly than the growth in number of air ports.

At the present time there are listed about 1,100 air ports in the United States. This number includes every class of landing field from a college golf course to the most fully equipped air mail station. There are about 165 permanent flying fields and sea-plane stations.

More Air Ports Needed

The only method at present available to increase the number of air ports is through the medium of municipalities, chambers of commerce, etc. As these bodies become interested either directly in obtaining for their town the air mail service, or indirectly in the development of commercial aviation, new landing fields can be established and the proper equipment provided. The prospects for a rapid development in this direction do not appear to be great at the present time.

There would seem to be more possibilities for development in the immediate future of proper equipment of the fields now provided. The air mail service has developed rather accurately designs for landing fields of several classes, while the experience of aviators is constantly showing the defects which are most in need of being remedied.

The first flight of the big Lawson air liner from Milwaukee to New York and Washington some time ago, brought to light a number of important difficulties in regard to certain landing fields. A part of the narrative of this flight, as detailed by one of the crew, points out vividly nearly all deficiencies of landing fields.

"Arriving at Ashburn Field, Chicago, we found a much less desirable landing field than the one we had just left in Milwaukee. Ashburn Field was very swampy and, consequently, we had to watch all the weather forecasts very carefully. Although there had been no recent rains, the machine sank into the ground and we experienced considerable difficulty in making a satisfactory landing. Some sections of the field were so bad, in fact, that had we gotten into them we would have had difficulty in getting out again. Had there been any rain, it would have been impossible for us to land on any portion of the field. Not only did we find the ground on this field very soft, but numerous objects in various parts of the grounds made landing difficult.

"Another bad feature of Ashburn Field, viewed from the standpoint of commercial aviation, is that the roads between the field and Chicago are very bad. The field is located about twenty miles from the city, and an automobile ride over the roads which connect the two is not a comfortable nor pleasant event. . . .

"At Toledo, we were unable to locate any field for some time, and were forced to circle about several times before discovering anything that even resembled a suitable landing place. In making the landing, we perceived several trees in the way, together with a hay-stack, and finally a harrow.

"The machine was first 'zoomed' to clear some of the trees and then 'sideslipped' to miss some others. We 'zoomed' again to avoid the hay-stack and were carried out of the field entirely. Upon circling again, it was discovered that the hay-stack had been blown down by the blast of the propellers, so that at least one obstacle had been removed. A safe landing was finally effected by straddling the harrow and placing the landing gears on each side to bring the machine to a quick stop. . . .

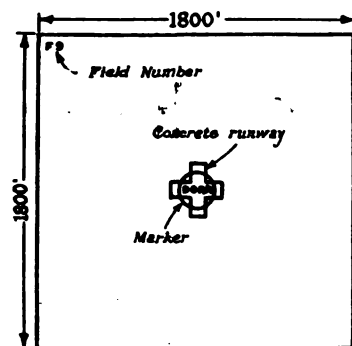
"When we got to Syracuse, ill-luck came to us and remained until we got out of that city. No sooner had the wheels of our plane hit the ground and the load begun to leave the wings and transfer itself to them than the machine sank into the soft ground up to the hubs of the wheels. Although the forward speed had been slowed down somewhat by the sinking of the wheels, the tail was brought high into the air as a result of the sudden stop. Though somewhat surprised at first, we finally discovered that this unsatisfactory condition of the field was almost typical of the landing fields throughout the county; suitable, perhaps, for light military machines, but unsuitable for the necessarily heavier craft of commercial aviation. This additional example emphasized to us the importance of constant rolling of landing fields. . . .

"Bolling Field, Washington, D. C., is controlled by the Government, but is by no means perfect. It has in it a number of ditches, which forced us to take to the air again after being about to land, to circle around and finally make another landing away from these obstacles."

Difficulties Are Clear

It is only fair to say, in connection with the above quotation, that those parts have been quoted which had particular reference to the defects in landing fields. The entire record supplies a few bright spots not shown in the above excerpt. The experiences, however, point out very definitely the chief difficulties encountered in providing proper air ports or landing fields.

The air mail service and the War Department have probably developed most fully specifications for suitable



1 ST. CLASS LANDING FIELD

Fig. 1

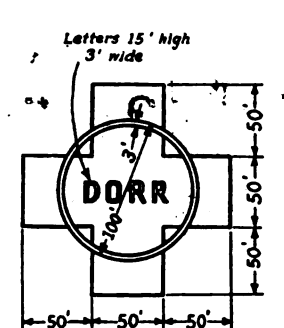
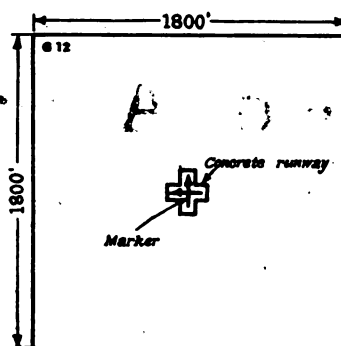
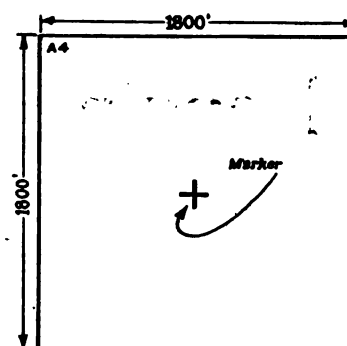
MARKING DETAIL FOR
1 ST. CLASS LANDING FIELD

Fig. 2



2 ND. CLASS LANDING FIELD

Fig. 3



3 RD. CLASS LANDING FIELD

Fig. 4

landing fields. This has been done to a large extent in connection with the work of locating the various air mail stations. To be placed on the air mail route, a municipality must provide a landing field which meets the air mail specifications. The specifications for municipal landing fields, drawn up by the War Department indicate briefly and clearly what constitutes an adequate air port for present needs. They are as follows:

SPECIFICATIONS FOR MUNICIPAL LANDING FIELDS

In the selection of landing fields at the different cities throughout the country, special attention should first be given to the following points:

- (1) That the position of the field bears some reference to the main aerial routes;
- (2) That it is unlikely to be shut in by future building operations;
- (3) That it is capable of expansion;
- (4) That it is situated close to transportation facilities and water supply but not necessarily within the city limits.

The specifications of the field will cover the following points:

- Size
- Shape
- Character of ground
- Approaches
- Marking
- Accommodations

Size: The minimum size of any municipal landing field will be such as to allow a 600-yard runway in every direction with no obstacles.

Shape: The best shape for a field would be a square or a rectangle but this is not absolutely essential. An "L" shaped field will suffice, provided each arm of the "L" is at least 300 yards wide and 600 yards long. The area of landing grounds on this basis will average 60 acres.

Character of Ground: The ground should be firm under all weather conditions. A light, porous soil with natural drainage is recommended as the most suitable, covered with close cropped grass. Fields with clay soil invariably demand special drainage and are unsatisfactory as a rule in wet weather. A concrete cross, 150 ft. by 50 ft. on each side provides an excellent wet weather take off and landing spot. Tan bark or firm soil would suffice. The surface should be level and smooth so that ships could normally land upon and taxi across without injury.

Approaches: All landing fields should be free from surrounding obstacles, such as high buildings, high-tension power lines, trees, etc. The country immediately surrounding the landing field should afford facilities for forced landing in event of engine failure while taking off.

Marking: A white circle, 100 feet in diameter with a band 3 feet wide has proven by experience to be an excellent distinctive marking for a landing field. This can be seen at almost any attainable height with clear visibility. It is necessary to keep the marking clear white to make it show up well. This can be done by white-washing from time to time. The name of the station should be marked in chalk letters 15 feet long by 3 feet wide. A wind indi-

cation, such as the standard aviation wind cone should be placed at one corner of field 30 feet off the ground.

Accommodations: The accommodations at these fields should provide communication by telephone, transportation facilities, gasoline, oil and sundry supplies.

In the selection of these fields it is imperative that future expansion be considered.

The War Department classifies landing fields in four classes, the last of which is merely for landing in case of an emergency. The design of a first class landing field, under this grouping, is illustrated in Fig. 1, while Fig. 2 shows the marking design in detail. Fig. 3 shows one type of second class fields, and Fig. 4 one type of third class fields.

Special equipment in the form of sunken lights has been developed by the air mail service for use in night flying. This equipment will show the aviator not only the direction of the prevailing winds, but also will indicate the direction of the wind during a storm, so that he can effect a safe landing at any time.

Commercial aviation, bringing with it heavier planes, complicates the problem of adequate landing fields. Nevertheless, that problem must be met. The design of such fields is practically complete at present, but the task of actually providing them is the important one which confronts the aviation industry. Whether it is to be accomplished by private air companies providing their own stations, as in the case of railroads, or by municipalities providing the ports, as in the case of water traffic is a question which the future must decide.

Training Apprentices for Permanent Jobs

(Continued from page 925)

facturing concerns can show as low a labor turnover as this for any department in their plant that might be chosen.

The excellent results achieved by the graduates of this apprentice school and the satisfaction they have given to the company, rests largely, of course, upon the fact that good men were chosen in the first place. Attendance at some of the classes in this school convinces one that the boys in this apprentice course are intelligent, sincere, and full of vigor; they may safely be said to be "above the average." The discipline exercised over them in class is not nearly so strict as in the ordinary school, yet the foolishness and lack of attention which often characterize the usual school room is almost entirely lacking here. The entire atmosphere speaks of young chaps ready and willing to work, attending school for a purpose and seriously achieving that aim.

An Englishman's View of American Production Methods

This story is interesting by way of comparison. A staff writer of the English trade magazine "Motor" visited the truck factory at Manchester. His report as it appeared in that publication, under the rather interesting headline "Secrets of the Ford Output," is printed here.

FEW people appreciate the immense output of Ford cars and one-ton trucks in England. It approaches 1000 a week.

There is a prevalent impression that the Ford factory at Trafford Park, near Manchester, is merely an assembling shop in which components imported from America are put together, but this is no longer entirely the case, as the engines and other components are now being assembled there. Practically the whole of the body work, including the hood and screen, is made, and an ever increasing proportion of the material employed is produced in this country.

All Setbacks Overcome.—Production at Manchester has, therefore, been hampered by all those setbacks which British manufacturers in general have experienced, but they have been overcome successfully, and to-day though not by any means at the high-water-mark the weekly output has reached a figure which should cause many manufacturers in this country "furiously to think" and give comfort to many car-less persons who are low down on the Ford order list.

Recently, under the heading of "The World's Wonder Works," we published in these columns some facts and figures concerning the immense Ford works at Detroit, taken from a paper by Mr. Thomas Gorst, who is the works superintendent of the English factory at Trafford Park. It was, therefore, a very interesting experience when, by the courtesy of Mr. Bate, the managing director of the Ford Co. in England, we were conducted round the English plant by Mr. Gorst himself only a few days ago, and were able to note the many labor saving devices employed and the general system under which the cars are being produced.

When going round the Trafford Park factory, one's mind instinctively recalls all that has been written about the great parent factory in America. There are on every hand the conveyors of which one has heard so much. The chassis are gradually being built up on a moving track, engines and wheels, petrol tanks and all such parts are arriving just where they are wanted at the moment they are required.

Inter-gearred Conveyors.—Parts fly about this factory like the change-balls in a draper's shop. Everything converges on the chassis assembling track. Moreover, all the movement is synchronized, the conveyors being inter-gearred. Should it be necessary to stop the chassis assembling track, the engine track stops also. Were this not so, congestion would inevitably occur. All material must pass smoothly through the plant, and as the cars are completed they must be sent away without delay, so rapidly do they come out. For this reason there must be the closest liaison between the factory management and the selling side. The output is forecasted a week ahead, and the figures given are adhered to. In the works superintendent's office is a bulletin board on which is recorded the

output every hour of the sixteen the factory runs each day. Thus the closest watch is kept upon the progress of the work.

Observing the extraordinary automaticity of production, one was impelled to refer to the factory as being a miniature reproduction of the famous parent plant, and there is no doubt that in the ingenuity of their methods the engineers at Manchester have all the benefit of association with Detroit. There is close liaison between them, and an interchange of ideas which makes for increasing efficiency in both factories.

One of the most impressive portions of the plant is the press shop, where a large variety of pressed steel parts are produced. Some of the presses are very large, and wings, body panels and doors are produced in great quantities, the dies for this work being made in the factory tool room.

The enameling system is especially interesting. Parts to be treated in this way are suspended from a moving chain, which carries them along and dips them into vats, and then takes them slowly through a heated drying chamber from which they emerge ready for fitting to the car. Paint brushes are out-of-date at Trafford Park, and even frames are dipped.

Labor-saving Machinery.—Radiators are produced with extraordinary rapidity. The long sheet-brass fins are turned out in enormous quantities on one machine, with the holes for the tubes punched and cupped, and the edges turned and flattened. These are placed in a jig, while the tubes (already sweated on the outside) are built up in another. Then, at a single operation, the tube block is pressed into the fins, and the radiator center is complete. Petrol tanks are rolled from a single sheet on one machine, the circular ends (already pressed to shape) are fitted in, and on another machine the seams are rolled and closed. Dipping into a solder bath completes the job.

One could go on almost indefinitely picking out operations which catch the attention by reason of their rapidity and simplicity.

A Valuable Foreign Trade Book

OF all the recent books and pamphlets on the subject of foreign trade, few possess as much valuable information in such a condensed manner as is contained in "Markets of the World," of the First National Bank of Boston. This book is, in reality, a series of maps, covering the world trade areas and showing the products of each district. This is effected by printing upon the maps in different colored inks the materials, both raw and manufactured, that are produced in the sections shown. Statistical information concerning business and economic conditions are also shown in accompanying sheets. The book was prepared by Harold A. Lyon of the Commercial Service Department of the bank. It is a loose leaf folder for ready reference and use.



Wabbling Front Wheels and Steering Knuckle Design

Editor AUTOMOTIVE INDUSTRIES:

I would like to call your attention to the "ad" in the *Saturday Evening Post* based on a statement and a warning issued to motorists by the United States Tire Company as follows:

"A displacement of only *one degree* in a wheel has the same effect on a tire as if it were dragged 92½ ft. per mile."

Wabbling front wheels probably have a displacement or misalignment up to three or more degrees, and assuming only three degrees, this, according to the above, would be equivalent to a drag of 277½ ft. per mile, or a little more than a 5 per cent drag.

Of course, a true front wheel *rolling* over a good road should have very little wear, and this seems a perfect explanation and accounts for the excessive wear so frequently encountered in wabbling front wheels. This same wear would also come upon rear wheels that are not in line.

As regards rear wheels, this misalignment may be caused either by the wheel itself or the tire if it is improperly mounted upon the demountable rim, and therefore with the rear wheel we have the wear occasioned by the wabbling and the *slippage* due to the driving force.

As regards the slippage per mile under ordinary road conditions, while this must be considerable, I should hardly imagine this would much exceed the 5 per cent drag referred to above; slippage due to starting and stopping in traffic excepted.

Will you let me know if you have any data on this point?

All of these causes of wear are avoidable, and though the cars may run it is at the expense of the owner, though it would undoubtedly be good business to correct these faults where possible.

With reference to the offset knuckle, I am more than ever convinced of the danger and disadvantage of this construction and must take exception to your statement that few steering gear breakages occur except through collision, as there are many cases of breakage and serious accidents due to steering gear collapsing on the road, and if you will consider this more carefully I am sure you will agree with me.

You say, "All that is necessary is to make the members of adequate strength, and with high grade material that is not at all difficult," but what is the use of giving way to a disease that can be cured by a cheaper and lighter construction?

With equal truth it might be said, there is no use of making a light wire wheel with spokes in tension, the wheels can be made with heavier wire spokes in compression and they will work and it is only a question of making these wires so heavy that they will not buckle under compression and, "All that is required is to make the members of adequate strength and with high grade material that is not at all difficult."

There is a principle involved in both these construc-

tions and you can't get away from them without serious consequences.

I do not know if it is possible from any records to obtain any data among the records of automobile accidents as to those occasioned by steering gear failures, but if so it would prove interesting and perhaps convincing.

W. J. P. MOORE.

Experiments made by S. F. Edge on Brooklands track, England, showed that wheel slippage on a surface similar to that of this track becomes appreciable only at high speeds.—EDITOR.

Some Foreign Trade Suggestions

Editor AUTOMOTIVE INDUSTRIES:

WHILE the American automotive manufacturer is looking to export trade as an outlet for some of his vehicles, he may be interested in some criticisms recently made on the British methods of handling this trade in the competitive territory. Perhaps there is a lesson for the American in some of the statements.

Before the war complaint was rife in Britain that the consular service was ineffective for trade, that the consular personnel was either too much foreign (German chiefly) or ill-equipped to be of service in technical affairs, and generally that the British market lacked keeping in touch with foreign markets, especially those in British dominions.

Since the war there has been a big improvement; in fact, it would seem to be too aggressive and too sudden, and the reports and criticisms of shortcomings lack little for completeness and searching inquiry. As an instance, note may be taken of the new report on the Trade of Australia for 1919, compiled by the Senior British Trade Commissioner in Australia. "The Australian," he says, "regards the British manufacturer as intensely conservative, unenterprising, generally out of date and rapidly losing his hold of the world's markets."

These allegations are directed against the manufacturer rather than the merchant, and particularly against manufacturers connected with the machinery (including electrical), motor car, small tools, hardware and allied trade.

Every fault or foolishness perpetrated by the home manufacturer or merchant becomes talked about and magnified out of proportion to its real significance. Particular examples of this are:—sending out from home ill-equipped and unsuitable representatives and the conduct of correspondence in an inexcusably slipshod and careless manner. Manufacturers should exercise greater control over the sale and distribution of their products; should keep in touch with the Department of Overseas Trade in London; should take greater care in the selection of representatives sent out from the home country; greater skill and care should be shown in the conduct of correspondence; and greater care and thought should be given to catalogues, publicity matter and advertising."

It is a curious reflection on "things left undone" that such obvious truisms are thought necessary to be set out

(Continued on page 933)

Industrial Partnerships Depend Upon Approach Rather Than System Used

The same plan for industrial partnership may succeed in one place and fail in another. An examination will show that the original approach to the problem was different. In analysing any plan, the good points must be separated; the whole plan need not be condemned nor commended because of a few bad points or a few good ones.

By Harry Tipper

A GOOD deal has been written at various times regarding some of the oldest plans for the adoption of works committees and the institution of so-called industrial partnership schemes.

In general, however, the discussion of these plans leaves some of the important items in doubt or does not cover them with sufficient thoroughness. In all matters of variance in the adjustment of human relations between the individual members of a group the differences are not determined so much by the general features of the system adopted, but by the small matters of approach or contact which grow out of the understanding, rather than the system. A comparison of the methods adopted in various concerns to encourage the employees to buy stock and to provide stock for them would indicate that most of these methods were similar in their general provisions and one would naturally expect that the result would be sufficiently similar or within reasonable boundaries.

Careful examination will show that the approach to the problem has varied more widely than the systems and the resulting effect upon employees in their attitude of mind towards the organization has varied just as widely.

In the following quotation from the Industrial Partnership Plan of the Dennison Manufacturing Company, there is more information as to the character of this experiment than in the whole of the system which is worked out.

The chief motives which led us to re-incorporate the Dennison Manufacturing Company in 1911 in the form of an industrial partnership were, first, to provide a better means of distribution of whatever profits there might be in excess of a fair return on capital; second, to make certain that the voting power would always remain in the hands of those intimately acquainted with the company's affairs. From the early days of the company, stock had been offered to employees at a figure below its actual value, but this plan proved insufficient, unsatisfactory and unfair in many ways.

At the time of the change our company had only one kind of stock, which was each year tending more and more to pass out of the hands of those connected with the business. A part of the profits had each year been withheld from dividends in order to provide for the growth of the company, and, therefore, from time to time there had been a distribution of the surplus in the form of stock dividends. The company had passed the stage where the capital invested in it was at greater risk than the normal business risk, and its financing, therefore,

required no more than a normal return to capital. Whatever more than this was earned by the organization, neither the needs of the concern nor the demands of justice required to be distributed to the stockholders as such. On the other hand, two considerations pointed to increasing danger in the future. First, the constant spectacle of all fruits of extraordinary efforts on the part of the managers, foremen or salesmen being turned over to people who were almost strangers to the company, could only result in a progressive weakening of enthusiasm and loyalty. Second, the steady increase in the proportion of stock held by people unacquainted with the business, pointed to the time when the voting power must inevitably be used for some other purposes besides the permanent good of the company itself. As a measure of safety for the future, then, the form of incorporation was changed.

It will be noted that the point of employee ownership is stressed very definitely in this preamble and some indication is given that the company had considered the wisdom of having the active responsible employees in the company participate in its direction.

The other interesting part of this preamble is to be found in the date of its adoption which is a considerable number of years in advance of the general consideration of such matters. The method adopted varies in a good many details from the general methods of distributing stock, as they have been considered by corporations in various lines of industry.

It does not provide for any general issuance of stock to employees without regard to their responsibilities. It does provide for the issuance of a particular form of stock for those in supervisory positions in whose hands the responsibility for the actual operations of the company rest, and upon whose capacity the value of the company's business is practically dependent. Neither does this plan operate in the field which is usually covered by the profit sharing methods. It is evidently aimed at giving a financial interest in the profits of the company to those who are responsible for its operations and at the same time providing a sufficient voting strength in the hands of these men to prevent changes in the policy of the company, which are not concerned with the necessities of its business operations or the development of its business value.

It is this plan which has given rise to the statement that the Dennison company re-incorporated so that the employees of the company would own it. The statement is not correct, but the plan goes far in providing for the

eventual control of the company by the men, from foremen in the works to managers in the commercial end, upon whose capacity and judgment the growth of the company financially depends.

It is interesting to note that the works committee plan was not adopted until eight years after the adoption of the original form of stock distribution, and it was not till after the works committee plan had been in motion that the industrial partnership fund was extended to take in all employees on a different basis from that which had been worked out for the managerial partnership.

The value of this plan to the Dennison Manufacturing Company can be understood only when the details of its approach and the details of its operation are studied. Whether such a plan could be adopted by other concerns or whether it would be valuable to do so cannot be determined at this time. Certainly the system would be of no particular benefit to another organization unless there was a full agreement with the purposes which were in the minds of the owners when they adopted it.

From time to time the discussion of profit-sharing plans has indicated the difficulty of sharing losses as well as profits, and consequently the absurdity of providing what amounts to a bonus system under the term profit-sharing. In connection with the profit-sharing plans adopted by Winship, Boit & Co., in Massachusetts, there is an unusual provision which I have been unable to find in any profit-sharing plan which has come to my notice heretofore.

This profit-sharing plan provides that the employees shall have placed to their credit one-half of the profits of the year 1920 and thereafter 50 per cent of this half is to be paid in cash and 50 per cent will be retained by the company for which they will issue certificates.

The usual provisions in the case of employees leaving the company, and so forth, are retained in this agreement, but it is provided in article five as follows:

In case that in any year a loss or losses occur in the business carried on by the proprietors as aforesaid, the same shall be borne in equal parts by the proprietors and the employee-partners if there are sufficient funds in the hands of the proprietors belonging to the employee-partners to meet such obligation, and the same shall be taken for that purpose from the general fund so held by the proprietors. If there are not sufficient funds so held by the proprietors the difference shall be advanced by the proprietors and shall become a charge against the general fund of the employee-partners as aforesaid. The deductions from this fund and all charges thereon shall be in proportion to the amount credited to each employee-partner.

It will be seen that this provision makes it necessary for the employees to pay their portion of the loss which may occur to the business in any year provided there are sufficient funds held by the company on employees' accounts for the purpose, and if not, these losses shall stand as a general charge against the fund to be paid for as the fund accumulates. It also provides that the losses shall fall upon each employee in proportion.

It will be very interesting to see how this provision works out. It has been accepted pretty generally in industry, that it will be impossible to maintain the proper relation with employees and charge them with any losses under their profit-sharing. In view of this general expression, an experiment which expressly provides that the employees shall share losses in the same proportion as they share the gains would be very suggestive in its

success or failure provided that the success or the failure of the scheme was related to this point.

At the beginning of this article, I said that the important differences in the working of new experiments were to be found as a rule in the details of the approach and the details of operation rather than in the plan of the general elements of the system.

The same thing is true, of course, in measuring the success or failure of any such experiments. We have not proceeded far enough with the analysis of these matters to enable us to determine from the general system what factors have entered into the success or what factors have contributed to the failure. It is not to be accepted that any of the present experiments are wholly valuable in all their details. In a good many of them the valuable part has been sufficiently large to overcome the disadvantage from any of the other provisions, at least up to the present. The progress on these lines, however, will depend very largely upon the increasing ability to analyze the factors of success or failure, without charging the results to the whole system and without condemning any experiment in toto because it has failed, from one or two unwise provisions or some doubtful methods of operation.

Without respect to the ultimate success or failure of the Dennison plan, for instance, there are many reasons why the active men—whose responsibilities over the operations of the company affect its condition very greatly—should have a voice in its policies and for a similar reason should share in the ownership of the company. This has been the purpose of many schemes of distribution of stock to employees, and lack of it has been one of the difficulties of the management.

Profit-sharing as a general matter, however, has not yet justified itself and it is not possible to indicate the value of this method in increasing the co-operative unity in an industrial establishment. Successful operations in this respect have been combined with other factors which in themselves would have been sufficient to explain the existing co-operation.

Some Foreign Trade Suggestions

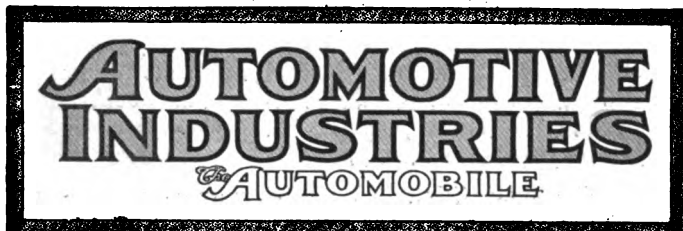
(Continued from page 931)

for the guidance and improvement of British trade in a continent so vastly important to the "motherland's" enterprise.

A writer in *The Motor Export Trader*, London, refers to the recent return of Major Goddard after an official trade tour of inspection of conditions and prospects in India, Australia and part of the East. Major Goddard was sent out on this quest by the Association of British Motor Makers (a purely British trade interests' body independent of the Society of Motor Manufacturers and Traders, which is cosmopolitan), and his journey was financially supported by the Government. The writer in that monthly export trade paper discloses nothing of utility concerning this delegate's tour, but states that he has compiled and well-arranged a large number of facts and that meetings of the branches of the motor trade are being arranged to discuss matters with Major Goddard.

ENGLISHMAN.

THE relative production of technical books is constantly increasing in Germany, according to an item in the *Zeitschrift des Vereines Deutscher Ingenieure*. Whereas until 1919 technical books constituted only one-twelfth of the total production of the German book-publishing industry, in 1920 the proportion attained a value of one-ninth.



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Automotive Industries—The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907, and The Horseless Age (semi-monthly) May, 1918.

A Present Day Problem

TWO things will be instrumental in bringing back the automobile industry to its normal peak—production efficiency and effective merchandising. Neither one nor the other can accomplish the task alone, but put together the result is certain.

Sound economics demand that a product be manufactured at the lowest cost consistent with quality and that it be sold at a fair profit based upon that economical production cost. Only upon this basis can permanent success and stability be assured. Consequently, a study and revision of production methods is of greater importance now than even when maximum production was the goal. The problem now is not high production but efficient production—high production per unit of machinery and per man.

An automobile production expert stated recently that an automobile factory which has not been almost entirely re-tooled within the last three years is not operating on an efficient basis, because machine tool

development during that period has been so great. Whether or not this statement be literally true, it points out clearly the factors of production which must come in for greatest study during the present period.

A recent issue of a technical engineering service bulletin states the problem in this way: "In this day when the selling price of manufactured articles is threatened with a big cut, it behooves every manufacturer to put forth his every effort to offset this loss. To meet and combat successfully with these conditions the working and brain-power of efficient engineers must be put into action, for your fastest drills count little in production possibilities if the jigs are slow and cumbersome." This statement was published as advertising material, but its timeliness and truth are not lessened by that fact.

More efficient production methods, then, are the first necessity in the effort to come out of the present slump. Added to them, however, must be more effective merchandising, better relationships between manufacturer and dealer, and better selling methods on the part of dealers and distributors.

Fuel Economy and the Petroleum Institute

IN a recent Bulletin the American Petroleum Institute urges automobile engineers to design automobiles with less powerful engines, so that our supply of liquid motor fuel may be conserved. There is probably not one among the designers of automobiles who will agree that, from a general public welfare point of view, this would be a desirable step. Where the difficulty comes in is that the automobile buying public does not yet recognize the need for fuel economy. The average purchaser will buy just as large a power plant as his means enable him to, and the salesman who would try to dissuade him from doing so with a fuel economy argument, would, in most cases, have little success.

It would be much better for the American Petroleum Institute to address itself to the automobile using public. An immense amount of fuel could be saved if cars of present design were handled in such a way as to obtain the greatest mileage per gallon—by adjusting the carbureter for a lean mixture, taking advantage of declines to coast, not idling the engine when the car is stopped, etc. But aside from this the public largely controls what type of car shall be built. The demand for powerful cars is not based on a sordid desire to burn the most fuel possible but upon real advantages of these cars, such as great flexibility, speed on hills, rapid acceleration, etc. If fuel economy is to be set foremost, motorists will have to forego some of these advantages.

It is to the general public using gasoline consuming apparatus that the Petroleum Institute should address its missionary efforts. If the public can be induced to buy cars which are economical in respect to fuel consumption, automobile engineers will supply the necessary designs.

Bricks and Bouquets

RECENTLY the same mail brought two letters to AUTOMOTIVE INDUSTRIES regarding Mr. Tipper's labor articles, which are a weekly feature of this publication. It is not unusual to receive letters regarding these articles, but the two mentioned are of special interest when read together.

The first of these two letters refers to an article published in the issue for Oct. 14, 1920, under the headline "Labor Unionists Are Merely Human After All." The letter follows:

Editor AUTOMOTIVE INDUSTRIES: I have received your journal of October 14th and must say that the article by Harry Tipper is the last straw. Wobbly propaganda has no place in a publication that contains useful matter.

From the headline to the last word, that article is absolutely indefensible.

If it is the intention of the management to allow your publication to sink to the level of Popular Mechanics or the Appeal to Reason, I would consider stopping my paper at once as sufficient admission.

Evidently we have here a man who thinks, as did some of the employers portrayed in the works of Dickens, that working people are not human. It is to these men that England can trace much of the labor difficulties of to-day.

The other letter does not refer to a single article, but speaks of them collectively. It follows:

Editor AUTOMOTIVE INDUSTRIES: I wrote you some little time ago, commending the articles which have been appearing weekly, for some time, in AUTOMOTIVE INDUSTRIES, and you, at that time, took time during a vacation trip to acknowledge receipt of my communication.

The fact a chap can take time away from golf and other vacation sports to acknowledge receipt of a letter shows a considerable degree of courtesy, which in turn prompts me to again commend you on an item appearing in the October 21 edition of AUTOMOTIVE INDUSTRIES. You are hitting the nail on the head and hitting it hard.

While I have only been a Chief Executive for the last ten or twelve years, in plants operating from perhaps three hundred up to twenty-five hundred or three thousand men, I have found that close contact with the average workman and discovering means of keeping his personal interest up, stimulating the mental effort of the average mechanic to the point where he will offer suggestions, and avoiding everything which suggests a domineering attitude, on the part of either the Chief Executive or Sub-Executives, has enabled me, at various times, to increase the individual's earning capacity and at the same time reduce total hours of labor and at the same time materially reduce the unit cost of construction.

Your good work, as covered by suggestions in AUTOMOTIVE INDUSTRIES, has given me, off and on, a good many suggestions and food for thought, which I have found exceedingly beneficial. The difficulty with a great many of the old time Executives has been absolutely unfair treatment of the man who produces.

In one particular plant which I have in mind, and which I re-organized, the unit cost of production at the time I started my work was \$13.50 average. The common workmen were drawing from 22 cents to 30 cents per hour. The shop was producing approximately 40 units per day average. With very little added to the mechanical equipment, just enough to produce the over-balance in the productive capacity of various machines, the same shop in two months was paying the men from 40 to 60 cents per hour and producing 200 units per day at an average cost of \$4.50. This may seem like personal history but it is not, however, intended as such, but simply to produce a proof of one of your statements to the effect that with exactly the right kind of treatment, wages can be materially increased, production can be stimulated and still the unit cost can be lowered.

I trust that this letter may not weary you. If it does, kindly so indicate to me and I will not bother you further. If it does not irritate you, I might possibly write again.

There you have your choice. Comment on these would be superfluous. We will only say that we do not know the industrial identity of the writer of the first letter. That is, we do not know his position in the firm with which he is connected, or what standing that factory has. The letter was not written on business stationery. The second was written on the stationery of a progressive company and was signed by the vice-president and general manager.

Walter Raleigh once said: "The average person brings to his reading, not a desire for information, but a desire to be confirmed in his own opinion."

We believe one of the writers is not the "average person" referred to.

Evidences of Stabilization Appear

Price Levels Bring Buyers to Market

Commodity Cuts Reflected at Retail—General Trend Helps Automobile

By JAMES DALTON

NEW YORK, Oct. 29—Evidence is found here and there that temporary stabilization has arrived or is approaching in some of the lines of manufacture where the sharpest price cuts have been made. This is more apparent in the retail than in the wholesale field. It indicates that the general level of prices has reached a point where public resistance is weakening and the family purse strings are being loosened for the purchase of essential and seasonable commodities.

Cuts in wholesale prices which were made weeks ago are only now becoming apparent to the ultimate consumer. Notwithstanding the slashing of prices there was little, if any, reduction in the cost of living for the average family last month but the decline for October will be considerable. Furniture, for example, now is being offered in New York stores for exactly half the price demanded in August sales which are supposed to mark the year's low ebb.

There has been a sharp decline in clothing for both men and women, furnishings for both sexes, and dry goods. This has been due in part to sales resistance and in part to the remarkably mild October which has made it possible to wear summer raiment. Retailers have decided to sacrifice profits and turn over their goods. Even food is coming down and a chain of New York's most fashionable hotels and restaurants has decided to offer a table d'hôte dinner for \$1.75.

Budget Drops 30 Points

The Annalist's index number which shows the fluctuations in the average wholesale price of 25 food commodities selected to represent a theoretical family budget, discloses a drop from 270 on Sept. 1 to 240 on Oct. 23. It is still 140 per cent above the normal for the period of 1890 to 1899. The decline of 30 points in wholesale prices in less than two months is not by any means reflected in the retail costs and presents a striking example of how long it takes for a wholesale price cut to get back to the purchaser.

Manufacturers and dealers in all lines should remember, however, that they will be doing business on a falling market for months if not years to come and purchases will be made with that fact constantly in mind. This is not a satisfac-

tory condition from the viewpoint of any one but the consumer, although it does not mean business can not be done at a profit. The expansion bubble has burst and it will be a long time before another one is blown.

Manufacturers who have thought they could leap full shod into the foreign markets with the certainty of being able to take up the slack in their domestic trade are doomed to disappointment. Economic conditions in all the countries on the globe are running a parallel to those in the United States. This is the inevitable result of a war which shook civilization to its foundations and proves that the situation which now exists in the United States could not have been avoided. As a matter of fact conditions in this country are much sounder and more hopeful than in almost any other land. Great Britain, Italy and Germany, to say nothing of many of the smaller countries in Europe, are trying to hide from the spectre of Sovietism. The same is true to a lesser degree in South America. After having enjoyed unprecedented prosperity, the Latin republics are feeling the reaction.

Banks Preserve Business

The United States has accomplished in an orderly way what other countries could accomplish only by going through a period of highly unsettled financial conditions. This is largely due to our superior banking system. The unshaken strength of the Federal Reserve system has averted a bank panic and permitted systematic deflation without staggering losses.

The present plight of the automotive industry cannot be considered without considering all these other factors. In this line there has been tremendous curtailment of production as the inevitable consequence of slackened demand. It is not probable that the slump will extend much further nor is there much hope that it will improve materially before the turn of the year. It is true, nevertheless, that the pendulum is swinging back and as AUTOMOTIVE INDUSTRIES showed last week by a nation-wide review of retail conditions, the tone of the market is distinctly better.

This improvement has not yet reached back to the manufacturer and probably will not for the next 60 days. The dealer was the first to suffer and he will be the first to recover. It must not be forgotten that the full effect of the decline in demand only recently began to be felt by the car manufacturers and parts makers. It would be remarkable if they were able yet to sense in their sales or orders any sign of improvement. Accumulated stocks must first be sold and orders will be placed on a hand to mouth basis for a long time to come.

(Continued on page 942)

Coal Operators Aid in Fight on Prices

Fight on Speculators and Release of Northwest Supply to Aid Industry

CLEVELAND, Oct. 30—Cleveland automobile manufacturers and others in the Middle West who reduced car prices in anticipation of lower production costs although conditions at the time did not exactly warrant cuts in prices will get considerable satisfaction out of developments recently in the coal situation.

All spring and summer automobile and parts manufacturers have been living on a hand to mouth basis so far as coal fuel was concerned. For several months coal has been going up the Great Lakes at the rate of 2,500,000 tons a week, while production has not been, until recently, near the mark that was set if the nation's needs were to be satisfied. Under such a situation the law of supply and demand not only operated to send fuel prices up, but speculators at the mines bid unwisely and they added to rising fuel costs.

But in Cleveland last week coal operators from all over the Middle West decided to join hands with the Federal Government in a movement to put out of business the coal speculator and thereby help to bring down prices for the fuel.

Divert Northwest Coal

Thomas K. Maher, president of the Maher Collieries Co. and one of the biggest coal producers in this section, predicted that coal prices would drop materially. He argued that the drop would come jointly through the fight on speculators, and as a result of action by the Government in suspending until further notice Order No. 10 which directed that 40 per cent of coal produced in this territory be shipped to the Northwest. This will daily send 4000 cars of coal from lake traffic into industrial channels. The complete release of this coal at the present time was considered somewhat early, but is largely due to the fact that the people in the Northwest will under no circumstances accept more coal than just enough to fill their actual needs this winter, as they expect prices to be lower next year.

The dumping of so much coal into the district is expected to have an influence for lower prices.

The operators in the course of their meeting here formed a committee to cooperate with the Government in the fight against speculators. Methods for conducting the crusade are now being outlined and will be ready for early action.

U. S. Rubber Drops Prices on Tires

Fabrics and Tubes Lead in Reductions

Statement Declares Position on Crude Rubber and Materials Warrants Cuts

NEW YORK, Nov. 1—Reductions in tire prices are announced by the United States Rubber Co. They range from 10 per cent on the larger sizes of fabrics up to 12½ per cent on Ford sizes of fabrics. Tubes have been cut 15 per cent and solid truck tires 10 per cent. Slightly smaller reductions are made on cord tires. In explaining the cut the company issued this statement:

"While the average prices of tires to-day before the reductions are no higher than the pre-war prices, the United States Rubber Co.'s position as to crude rubber and other materials is such that it feels warranted at this time in making the reductions named.

"It is gratifying to the company to be able to meet promptly the trend of the times towards lower prices of commodities. They further trust that their action may assure an orderly procedure in the tire business during the coming year."

The United States is the first of the larger companies to make a general reduction in prices. The Lee Tire & Rubber Co. and several of the smaller concerns already have moved in this direction, however, and the trend of tire prices is downward. Similar action in the near future by other large companies would not be surprising.

When the cuts are made they will bring the prices of tires back where they were before increases were announced last March. As a matter of fact few dealers ever paid the increase announced at that time and not many purchasers were affected, for dealers generally ignored the list prices.

Fisk Reduces Prices

Reductions closely approximating those of the United States Rubber Co. also are announced by the Fisk Tire & Rubber Co. They range from 10 per cent to 12½ per cent on fabrics with a smaller cut on cords. The detailed price lists have not been prepared.

Goodyear Denies Cut; Concession to Dealers

AKRON, Nov. 1—Goodyear officials to-day flatly denied stories published in New York papers that prices on Goodyear solid and pneumatic tires had been reduced from 15 to 17½ per cent, effective Nov. 1. The only price reduction made by Goodyear is 3 per cent to deal-

ers only. This reduction does not affect consumers and is only to give dealers a larger margin of profit.

Goodyear factories resumed operations to-day after a week's shutdown for inventory. The company will abolish four-day weekly basis of operation and will start running five days a week. The production of 12,000 tires daily on four-day basis or 48,000 a week will be changed to 10,500 daily on five-day basis or 52,000 tires weekly. Employees will be given a week off during the Christmas holidays.

Goodrich Maintains High Dividend Rate

AKRON, Nov. 1—The B. F. Goodrich Co. has declared a regular quarterly dividend of \$1.50 a share on the common stock for the last quarter of 1920 and the first quarter of 1921. The dividends are payable Nov. 15 and Feb. 15 to stockholders of record Nov. 5 and Feb. 5. The regular quarterly dividend of \$1.75 on preferred stock also has been declared, payable Jan. 1 to stockholders of record Dec. 21.

The dividend action of the company was something of a surprise, as it had been expected its rate would be reduced. The payments indicate that the company has weathered the financial storm with flying colors. It obtained \$30,000,000 in new money on notes last spring.

Harvester Guarantees Tractor Price to May 1

CHICAGO, Nov. 1—The International Harvester Co., which recently advanced the price of its tractors \$100, has decided to give every tractor purchaser a written guarantee that he will be given the benefit of any price reduction up to May 1. This has been done because most prospective buyers anticipate lower prices and it is felt that if they buy now under this agreement they will have the use of a tractor this fall and in the spring. The company has notified its dealers that they will be authorized to sell tractors in such a way that farmers will have a year to pay for them.

The Harvester company feels that the tractor business will be improved materially if the farmer has financial assistance, especially in sections where crops have been good. They are just as anxious to have tractors now as at any time but credit still is tight.

NASH FOUR PRICE, \$1,395

KENOSHA, WIS., Oct. 27—The price of the Nash Four with cord tires as regular equipment is \$1,395 according to announcement made to-day. This is on the touring car and roadster. No price on the sedan and coupé has been fixed as yet.

Akron's "Big Four" Enjoy Largest Year

Goodyear First With Sales of \$205,000,000—Leaders Ex- ceed Half Billion

AKRON, Nov. 1—Akron's larger tire companies are rounding out the biggest and most successful year in their history despite the slump in the tire business, as indicated by sales reports of the Goodyear, Goodrich, Firestone and Miller companies, the "Big Four" of the tire industry, issued Nov. 1.

Goodyear surpasses all others with sales for the fiscal year ending Oct. 31, aggregating over \$205,000,000, as compared to \$167,000,000 last year. Firestone with sales of \$75,000,000 two years ago and \$91,000,000 last year, reports that its fiscal year just ending will show sales in excess of \$105,000,000. The Miller Tire & Rubber Co., its officers announce, has had greater sales during the first ten months of the current year than during the entire year of 1919. Last year's sales were \$27,116,588. Sales so far this year are \$27,440,743. The company expects its aggregate business up to Jan. 1 to exceed \$31,000,000.

The B. F. Goodrich Co., conforming to its policy of not announcing sales by months or periods, although giving no definite figures, indicates that its business so far this year is far in excess of its 1919 record of \$143,000,000.

These announcements, tire company officials state, should tend to offset unfortunate rumors spread broadcast that retrenchment in the tire industry has caused Akron to slip and that Akron's rubber companies are on the verge of shutdown. The low ebb of the tire slump has been passed, tire experts say, and business is picking up. Outlook for the future is far more optimistic than at any time during the past two months, and all manufacturers are laying plans to resume normal production Jan. 1.

NEW DEPARTURE CUTS FORCE

HARTFORD, CONN., Nov. 1—The New Departure Mfg. Co., a subsidiary of the General Motors Corp., has laid off more than 1800 employees in the last month. All but 75 of the 680 hands in the Hartford division at Elmwood have been dismissed. All departments are affected. The new division at Meriden, known as Plant D and which was erected and equipped at a cost of approximately \$2,000,000 has not gone into production, although it was planned to begin operations this fall. Hundreds of workmen at the main plant in Bristol have been dismissed in the last few days.

Olympia Exhibits Show Truck Progress

Developments of Seven Years
Attract Engineering Attention
—Little Effect on Trade

By M. W. BOURDON

LONDON, Oct. 16 (*Special Correspondence*)—Writing on the second day of the Industrial Motor Vehicle Show at Olympia, London, the first to be held in the United Kingdom since 1913, it may be said that while as a display—an international exhibition—of commercial vehicles, it is an unqualified success; from the sales departments' point of view it lacks a very great deal. A cloud lies over this section of the British automobile trade at present, one that is far more pronounced than that which exists over a part of the private car section, and it requires more than an exhibition to disperse the gloom occasioned thereby.

To the engineer the show is of great interest, for, as might be expected, the interval of seven years since the last British show of this nature has had a great deal of effect upon design in the vast majority of cases; in addition, quite a number of new models are on view for the first time.

Some 224 vehicles are present, comprising 60 American, 97 British, 20 French, 8 Italian and 3 Swiss petrol-engined trucks and vans; 22 British steamers and a small miscellaneous selection of British and American electric trucks and agricultural tractors. As a display of the latter, the show is lacking, for actually only half a dozen of all nationalities are present.

Among the truck innovations are the Straker Squire 3-5 ton and the Maudslay 6-ton new models, both of which have the driver's seat moved forward considerably, the driver being placed as in the new K type London bus chassis, recently described in AUTOMOTIVE INDUSTRIES, viz., slightly above and almost alongside the engine. The Straker Squire has a larger number of variations from standard practice, notably in the spring anchorages, valve mechanism and frame construction.

Bristol Chassis Appeals

Another new make, which is attracting a great deal of attention, is the Bristol 3-4 tonner. This is made by the Bristol Tramways Co., a firm which has for many years past been running fleets of buses and trucks purchased from various makers. The new vehicle embodies the firm's experience as users, and the interests of the latter are carefully considered; naturally, an expensive chassis is the result, but one which appeals in almost every detail to the engineer.

The first British six-wheeler—petrol tractor and two-wheeled trailer—appears at Olympia. This is the Scammell, which, while in general appearance resembles the Knox, has innumerable points of difference in construction.

Besides trucks ranging from 250-lb. to 14,000-lb. load capacity, the exhibits include municipal vehicles of many kinds—road sweepers and sprinklers, fire pumps and dump wagons—while a considerable proportion consists of public service passenger carriers from taxicabs to saloon buses and charabancs. The display of accessories is also extensive and varied.

No British truck maker has yet committed himself to pneumatic tires as standard, or is yet prepared definitely to recommend them, for loads of over 30 cwt. Approximately one-fourth of the vehicles at Olympia have pneumatics, the giants and twins for rear wheels being about equally in favor. But in all except a few instances above 30 cwt. loads, trucks have solids, the pneumatics mostly appearing on the wheels of charabancs and buses.

Experiment With Pneumatics

British makers are experimenting with pneumatics, but many of them are quite in the early stages of this practice. Where they are inclined to admit the advantages of air-filled tires they usually favor twins for the rear wheels, on the score of the lower inflation pressures and the interchangeability of the six (or seven with one spare) units—detachable wheels and tires.

Michelin has the biggest vogue in twins, the latter being fitted to his single disk detachable wheels, the largest tire size being 955 x 155 (approximately 40 x 6 in.), with clincher edges and fabric carcass. Dunlop is making this type and also giant pneumatics of the straight-sided variety, but has not gone very far with them yet.

Austin Stock Drops in Crisis Abroad

LONDON, Oct. 8 (*Special Correspondence*)—A fall in the price of shares of motor manufacturing companies has been the natural and inevitable corollary of the combination of adverse conditions with which the industry has been confronted. In some instances the fall in market value has been very severe, and this factor perhaps induced the directors of the Austin Motor Co. to submit a statement to the shareholders regarding its position.

Certificates of valuation and audit indicate a surplus of assets over liabilities of £4,804,000 (pre-war rate nominal \$24,020,000) and a profit for the year 1919 of £238,000 (\$1,190,000), apart from £79,000 (\$395,000) forthcoming from various adjustments.

With regard to subsequent profits the auditors state that during the two months of June and July when the program of output estimated in April of this year was practically attained, a satisfactory profit on the company's capital was earned. Shareholders are urged by the chairman not to be unduly disturbed by the present market value of the shares, but the decline from par to \$1.75 in the price of the preferred \$5 stock in a few months must cause a good deal of anxiety.

Exports Important to Speed Industry

Banker Would Cut Cost of Government—Must Live Sanely for Time

CLEVELAND, Oct. 30—"Interest rates are coming down, and I am sure that if we can live through the next two or three months sanely we can go into the new year with confidence and complete satisfaction that we are getting back again to normal. If we can only get our Government's expensive operation cut down to a reasonable basis, we can feel confident of the future."

The above message was delivered to the Cleveland Advertising Club by Willis Booth, of New York, vice-president of the Guaranty Trust Co.

"Prices are not going to the pre-war basis," said Booth. "Our tremendous debt as the heritage of future generations in itself will prevent that. Exactly where the level is going to be will be determined by public opinion largely, responding to the law of supply and demand. The consumer will tell you the time when liquidation has gone far enough and we must keep our ears to the ground to determine when that time has arrived."

"Our war situation has increased our ability for mass production, and the great problem of our factories and their present concern is due to inability to keep up the volume of production necessary to protect overhead and fixed investments. The fact that our export is seriously handicapped by our exchange situation brings us face to face with a very serious national problem as to what our future course in our commercial relations with our neighbor nations may be."

"In past years, realizing that 90 per cent of our business was internal, we elected to preserve our wage scale at the sacrifice of foreign expansion. Foreign wage scales were low. I think this course was wise, but the situation has changed. Wage scales abroad will never again be so low as they have been in the past."

Exchange Rate Big Problem

"The exchange situation presents a difficult problem. We can not establish a normality of exchange and make the dollar a measure of exchange throughout the world unless we both buy and sell. We must draw a fine line as to the things we will buy. This will, of course, require genius in the development of our tariff construction so that we may bring in as many things as possible that will not affect American industrial production—such articles as coffee, cocoa, rubber, etc.—but we must bring in, in addition thereto, a further amount of the articles of commerce of the world as will cause our buying and our selling, in relation to the buying and selling of other countries, one with another, to make it possible for us to have a reasonable parity of exchange."

Car Imports Grow to Sizable Figure

First Nine Months of Year Show
776 Brought in—September
Imports 201

WASHINGTON, Oct. 29—Revival of foreign competition in domestic markets for automobiles is clearly indicated in the import statistics compiled by the Bureau of Foreign and Domestic Commerce for September and the eight preceding months. The figures for each succeeding month of this year show marked increases in the volume of foreign shipments.

During the nine months of the present calendar year, 776 automobiles were imported into this country. Their declared value amounted to \$794,910. These totals represent a remarkable increase as the 67 automobiles brought in during the corresponding period last year were valued at \$36,677. Of the total for this year, 201 cars with a valuation of \$191,707 were imported during September, as compared with 10 cars valued at \$9,674 for the same month in 1919.

Automobile parts, except tires, imported during September, 1920, were valued at \$185,555, or double the import for the corresponding month last year. The nine months' parts total for this year amounted to \$935,915, or about eight times the value of foreign-made automobile parts for the same period last year.

The statistical exhibit of the Government does not attribute the causes for the return of 4390 automobiles valued at \$7,196,283 to this country during the first nine months of this year. It is believed that many of these cars were owned by the army. Then, there are instances where re-shipments of American-made cars have been included in these figures.

During September, 1920, 302 cars of American manufacture, with a valuation of \$391,170 were returned, as compared with 349 cars valued at \$592,686 for the corresponding month in 1919. But, the nine months aggregate of returned cars in 1919 only amounted to 660 cars valued at \$1,014,978.

GUATEMALA BUILDS ROADS

NEW ORLEANS, Nov. 1—The road from Guatemala City to San Salvador, respective capitals of Guatemala and El Salvador, is being built to a width of 30 feet, hard-surfaced and prepared for automobile and motor truck traffic, according to Irigoyen Cob, a banker of Guatemala City who is in New Orleans on business. Another link of road, 110 miles in length, is being constructed by army engineers of both countries, from Zacapa in Guatemala, to the Salvadorean border. Still another link, 10 miles in length, which will open the way for a highway from the northern border of Guatemala to Mexico City, capital of Mexico, is being built, according to Cob.

Exports of Automobiles, Airplanes, Trucks, Farm Tractors, Motorcycles and Parts for September and Eight Previous Months

	September 1919		September 1920		9 Months Ending Sept., 1919		9 Months Ending Sept., 1920	
	No.	Value	No.	Value	No.	Value	No.	Value
Airplanes	21	\$44,700	5	\$17,370	32	\$130,200	46	\$398,574
Airplane parts.....		47,064		9,331		3,140,412		516,689
Commercial cars...	1,384	3,428,496	1,747	3,035,028	11,091	26,814,829	22,110	34,583,565
Motorcycles	1,717	492,829	1,841	566,217	15,996	4,341,281	26,579	7,272,387
Passenger cars	6,383	6,838,439	10,431	12,548,096	44,291	48,823,761	110,226	124,396,885
Parts, not including engines and tires		4,562,233		7,311,951		30,395,973		62,426,828

Engines

	September 1919		September 1920		9 Months Ending Sept., 1919		9 Months Ending Sept., 1920	
	No.	Value	No.	Value	No.	Value	No.	Value
Automobile, gas....	4,391	\$641,984	2,477	\$397,929	23,043	\$3,568,133	29,530	\$4,776,381
Marine, gas.....	602	239,209	537	201,336	8,707	3,717,794	7,508	2,407,778
Stationary, gas....	3,447	390,895	2,833	445,363	19,770	2,861,812	22,521	4,013,646
Tractor, gas.....	1,642	1,489,688	2,299	2,118,965	16,227	16,218,898	17,630	16,815,715
Total.....	10,082	\$2,761,776	8,146	\$3,163,593	67,747	\$26,366,637	77,189	\$28,013,520

Algiers to Hold Show Open to All Makers

NEW YORK, Oct. 29—An exhibition of automobiles, tractors and automotive farm equipment will be held in Algiers during April of next year, according to information reaching here. This showing, which is expected to continue for at least a month, will be part of an agricultural show and fair (Concours General Agricole de l'Afrique du Nord Foire de Produits Algeriens), the Governor General of Algeria being the honorary president. The annual Congrès des Agriculteurs de France will be held in Algeria next year and the opportunity was taken to organize the proposed, showing in connection with it.

The section devoted to automotive equipment will be open to manufacturers of foreign countries as well as France. Tractor manufacturers will be charged at the rate of 15 francs per square meter, in the open, and they may erect their own structures. The price for car exhibits has not been settled. Communications concerning the show should be addressed to Celestin Granier, Commissaire General, 4, Rue Marechal Bosquet, Algiers.

TIRE MARKET GOOD IN EUROPE

AKRON, Oct. 30—An unlimited field for the American truck, motor car and tire manufacturers exists in European countries, in the opinion of Lucien L. King, advertising manager for the Good-year Tire & Rubber Co., who has just returned from a four months' tour of Europe where he engaged in a survey of business conditions. He states that as soon as economic and business readjustment in those countries is consummated the market will be ready for the Americans. Low rates of foreign exchange, he said, constitute natural handicaps at

present, but he found that conditions are rapidly becoming readjusted and the outlook for the American manufacturer, he thinks, is bright.

Moratorium Deadens Sales Market in Cuba

NEW YORK, Nov. 1—The Moratorium in Cuba has seriously retarded exports of automobiles to that country. Cubans who considered themselves wealthy prior to the slump in the price of sugar had placed heavy orders for American automobiles, most of which were of the more expensive type. When the moratorium was declared many of these orders were cancelled because the Cubans could not finance the deal.

Export automobile business with South America also has been curtailed because of the adverse exchange rate in those countries and some orders have been cancelled, particularly for the more expensive cars, while other deliveries have been delayed.

TITAN ALLEGED BANKRUPT

NEW YORK, Nov. 1—A petition in bankruptcy has been filed by creditors against the Titan Automatic Tool Co., Inc. Judge Mack has appointed Laurence Berensen as receiver under bond of \$15,000. The liabilities are estimated at about \$50,000 and the assets at \$40,000.

A CORRECTION

In AUTOMOTIVE INDUSTRIES for Oct. 7 it was stated that the Delage automobile had been placed on sale in New York by the Pertival K. Frowert Co., Inc. It should have been said that the Delage Concessionnaires (U.S.A.), Inc., had opened salesrooms at 26 West Fifty-eighth Street. The Frowert company is advertising agent only for this company.

Fair Regulations Urged for Trucks

Philadelphia Association Hears Need for Uniform Laws Based on Scientific Study

PHILADELPHIA, Oct. 29—Pleas for fair play on the part of the city, State and national authorities with regard to traffic regulations, road building and maintenance, and proper use of the proceeds of motor truck license fees in dealing with the motor truck industry were made by speakers at the first fall meeting of the Motor Truck Association of Philadelphia, in the Adelphia Hotel.

David E. Fenner, of the International Motors Co., New York, former president of the Motor Truck Association of America, in an instructive talk on highways and the use of heavy duty trucks, said that contrary to general opinion the Bureau of Public Roads at Washington is demonstrating by tests that the heavy duty truck is not the chief destroyer of roads. The same amount of merchandise, he said, hauled by a large number of high speed trucks, by the more frequent use of the highways, wears them out as much, or more, than it would if carried in heavy duty trucks. Unsprung weight and high speed, he said, are the biggest factors in road destruction, and the Government, he added, is trying to ascertain the best capacity of truck to use to get the most per dollar out of money spent on road building.

Fenner urged the adoption of uniform laws in all States on truck weight, size, load, tire widths and license fees, in order to get greater efficiency for the road user and road builders.

Walter S. Anthony, president of the association, who has succeeded J. P. Cranston in that office since the latter's resignation to enter the automobile financing business, called on the members to conduct a campaign of propaganda in defense of their industry which, he claimed, was apt to be unfairly treated unless its interests were properly presented to the legislators.

Roads Behind Truck Growth

W. R. D. Hall of the commercial service department Philadelphia National Bank, formerly statistician of the Pennsylvania State Highway Department, presented some interesting facts about the work of that department. He said that the automotive industry had grown so rapidly that it had been impossible to build roads of adequate strength to stand the strain of traffic. While there are 98,000 miles of roads in Pennsylvania, he said, only 10,181 miles is improved.

About 229 miles of highway has been resurfaced in Pennsylvania this year, out of fees for motor vehicle licenses. Hall urged that the license money be spread over the State for use in road work and that it should not revert to the city or county where collected, claiming that the vehicle owners of populous centers use

TRUCKS GAIN CASH FOR FARMERS' WHEAT

OMAHA, Oct. 29—Unable to obtain cars in which to ship his wheat and finding Omaha elevators filled to capacity D. C. Hibbard, a Potter, Neb., farmer, carried 110 bushels of wheat on his two-ton truck to Omaha 480 miles.

The trip required three days. The total expense was \$22.09 or about 21 cents a bushel.

The wheat sold on the Omaha market for \$2 a bushel, which Hibbard said insured him a better profit than he would have received by selling at home.

the roads in the country more than do the people of the country districts, and should pay for them.

Thomas K. Quirk, former president of the association and present chairman of the legislative committee, criticized the bill passed by the New Jersey House, and which is to come up before the State Senate shortly, which increases the license fees in some cases as much as 400 per cent over current rates.

To Build Samson Truck at Janesville Factory

JANESVILLE, WIS., Nov. 1—The Samson truck operation of the General Motors Corp. will be concentrated on Dec. 1 at the works of the Samson Tractor Co. here, according to official announcement made by W. C. Durant, president of the corporation, while inspecting the Janesville works during the week. The Samson line of trucks has been manufactured and assembled at a number of other General Motors plants pending the development of the Janesville works to the point where it can handle the truck production in addition to the Samson tractor. A 9-passenger car designed particularly for rural use, first shown in complete form a year ago, will also be put into quantity production by the end of the year.

STOCKTON RUBBER BANKRUPT

STOCKTON, N. J., Nov. 1—The Stockton Rubber Co. has filed a voluntary petition in bankruptcy listing its liabilities at \$95,602 and its assets at \$79,528. E. K. Price, secretary of the company, has been named as temporary receiver under a bond of \$10,000. Most of the creditors are from Trenton.

EMPLOYERS FOR ASSOCIATION

CLEVELAND, Nov. 1—Cleveland employers have formed the American Plan Association of Cleveland of which 70 per cent of the employers of the city already are members. The members employ approximately 85 per cent of the workers in this district. Fred C. Chandler, president of the Chandler Motor Co., is president of the association.

Government Shows Army Car Disposal

Denies Reports of Neglect in Selling Vehicles—Claim Savings of Four Billion

WASHINGTON, Oct. 30—Specific denials were made to-day by the War Department to charges of negligence in disposing of automobiles used for war purposes. It is claimed that the Department has saved over \$4,675,342,881.15 to tax payers through the sales of surplus war supplies and settlements of claims of all sorts.

The War Department stated that the charge that 130,000 automobiles were in possession of the Motor Transport Corps at the close of the war is obviously false for there were but 100,000 cars on hand at the signing of the armistice. The sensational accusations against War Department officials to the effect that 1000 Packard limousines were parked out in the open at Camp Holabird, Md., for eleven months with the upholstery rotting and tires bursting, were also stamped as without foundation in fact.

In reply the Government pointed out that only 71 passenger vehicles were obtained from the Packard company.

An official statement as to the number of cars owned by the War Department at present and the transfers to other departments follows:

"The facts are that there were approximately 100,000 automobiles on hand, and for several months after the armistice no action relative to the disposition of automobiles could be taken pending military developments.

"On April 12, 1919, the War Department declared a surplus of motor vehicles and first offered them to the other Government departments, in compliance with Congressional Acts, before placing them on sale to the public. To-day the War Department has 54,167 motor vehicles of all kinds.

"As stated, the War Department was authorized by Congress to dispose of motor vehicles by sale or transfer to other Government departments. This transfer was practically completed April 8, 1920, and there had been transferred to the Bureau of Public Roads 23,071; to the Post Office Department, 6725; to the Public Health Service, 1141; to the Navy Department, 559, and to other branches of the Government, 178. The vehicles transferred consisted of 24,778 trucks, 4054 touring cars, 1278 ambulances, 1556 motorcycles, 7 tank trucks, and 1 trailer.

NAME HIGHWAY TRUCK RECEIVER

CHICAGO, Nov. 1—The Highway Motors Co., manufacturers of the Highway-Knight truck, has been thrown into a receivership. Reports that its assets were to be acquired by the Root & Van Dervoort Co. have been denied by the latter company.

Natural Gas Users Face Cut in Supply

Depletion of Product Leads to Restrictive Action by Bureau of Mines

WASHINGTON, Oct. 29—Officials of industrial plants in Ohio and Pennsylvania were to-day advised by the United States Bureau of Mines to prepare for extreme measures in conservation of natural gas, a non-regenerative product which is used almost exclusively in manufacturing centers for fuel purposes. The Government has sounded a warning to the effect that it will be impossible to operate plants in those territories where an intensive and thorough survey has determined that the natural gas supply is greatly depleted.

Restrictions of the gas to illuminating and heating of homes will affect automobiles and automobile accessory plants where natural gas is used as fuel. The Government refrained from commenting on the situation until it was evident that the extraordinary measures adopted by the State authorities could not produce the anticipated results—real conservation.

By far the larger part of natural gas consumed in Ohio and Pennsylvania is used by industrial and manufacturing plants, the Government claims, and these plants face the practical certainty of having their supplies shut off by public service bodies during the coming winter in order that the domestic consumer may not be deprived of his light and heat.

Engineers say that to change from gas burners to coal would require suspension of operations for an extended period, though it might be possible to run certain plants during the conversion process. Natural gas experts, in a conference here, insisted that it was essential that the demand for gas should be curtailed to one-third on the basis of still having the same service through improved efficiency in use.

It is pointed out that with 2,400,000 domestic natural gas consumers, the national aspect is obvious for the situation is acute now and will become worse each year. Production has fallen off owing to rock pressure and volume of old and new wells, a decline in the number of acres of natural gas land held, and the number of producing wells per consumer. The advantage of natural gas to manufacturers, it is said, is in the heating value, which is worth twice that of the average manufactured gas.

CANTON PARTS FILES PETITION

CANTON, OHIO, Nov. 1—Application has been filed in the State courts for a receivership for the Canton Automobile Parts Mfg. Co. Some of the largest stockholders are the petitioners and the action is said to follow disagreement over policies. J. H. Firestone, president, and Frank E. Hall, secretary, join in the

petition. Liabilities are estimated at \$115,000 with practically no quick assets with which to meet them. The petition states that business now is being conducted at a loss and that the assets have been wasted through mismanagement because of the refusal of S. S. Kurtz, the treasurer, to co-operate with the other officers. The company was organized to manufacture the Kurtz piston ring which was invented by Stewart Kurtz, a fourteen-year-old boy.

Steel Orders Fall Off; Lower Prices Expected

YOUNGSTOWN, Oct. 30—Decline of steel prices is forecast by steel officials of the Mahoning and Shenango Valleys by admissions of this week that cancellations have been heavy in the last two weeks and that new business has not held up to expectations. Coupled with the decline in coal prices, weakening of copper prices and an expected break in the furnace coke market, steel makers believe that the industry is due for general price reductions. Automobile sheet makers and manufacturers of tubing and channels for automotive purposes report a general backward tendency to the market together with cancellations.

One sheet mill that has been a producer for automobile manufacturers is expected to shut down this week on account of lack of orders and stacks of sheets stored after cancellations. Other up-valley sheet producers are either already shut down or operating on much reduced scale.

Close observers of the iron and steel industry here say, however, that readjustments will not be as severe as those experienced in other industries because of the great over-hanging world need which must be largely satisfied in this country.

BRADLEY RECEIVER ASKED

CICERO, ILL., Nov. 1—The Maremont Mfg. Co. of Chicago has filed a petition in United States court asking for a receiver for the Bradley Motor Car Co., which is held to be in financial straits. The Maremont company has a claim of \$872, the B. F. Goodrich Co. one of \$1,100 and the Chicago Steel Foundry Co. of Chicago one of \$43. The petition states that the company has several finished automobiles on hand as well as a number in process and a large inventory together with accounts receivable. The liabilities are estimated at about \$100,000 with assets somewhat larger.

DAVIS TOOL FILES SCHEDULES

NEW YORK, Nov. 1—The William E. Davis Machine Tool Co., Inc., of this city and Chicago, has filed schedules in bankruptcy, with liabilities of \$90,789 and assets of \$70,883. The Market Trust & Savings Bank, Chicago, is a secured creditor for \$20,064. The Fitchburg Machine Works has an unsecured claim of \$14,296.

Cleveland Reduces Number of Workers

Large Forces Laid Off in Industrial Plants to Reach Normal Basis

CLEVELAND, Nov. 1—Both office and shop forces in Cleveland industrial plants have been curtailed to such an extent that it is estimated that between 20,000 and 30,000 men are idle and workers are coming from other cities and are offering to take jobs at lower wages. This development, which has come about in the last month together with the decision in this city by bituminous operators to bring about the elimination of unreasonably high prices for fuel, are accepted as evidence that the automobile industry, as well as all other industries, are going to get back on a stable business basis much quicker than was expected.

In the metal trades, factory and office forces have been reduced as much as 50 per cent in certain shops; others have reduced labor forces 35 to 40 per cent. In the plants making automobiles and automobile accessories labor cuts have been made. Most of the local plants making structural shapes, such as automobile bodies, have cut at least 25 per cent. Screw works have laid off 20 per cent of their men; 50 per cent cuts were made in some of the gear turning shops.

Cancellation of certain orders resulted in the laying off of 1200 men in an automobile accessory plant. Thirty to 35 per cent of the employees in twenty Cleveland foundries have been laid off. This affected 2200 men, most of them molders, core makers and their assistants. Men remaining in the shops are speeding up production. One foundryman says that after he cut from 16 to 10 men his production remained the same.

It was reported that many shops operating 75 per cent of normal to-day are really doing so with 65 to 67 per cent of the men needed six months ago. Employment managers of several large factories report that where a few weeks ago one or two men would apply for work, 200 now appear. One employment manager says that three months ago he could not get a man, while to-day 200 apply every morning, many of them fine mechanics.

An investigation fails to show extensive wage cutting. It has been done in some instances, however; in one plant where it was tried, 90 per cent of the employees affected by the cut decided to remain with the company.

BRADFORD FORMS COMPANY

CLEVELAND, Nov. 1—The Manufacturer's Sales Co. has been organized here under the management of C. C. Bradford, former sales manager of the United States Light & Heat Corp. and the Marlin-Rockwell Corp. The company will represent manufacturers in the Cleveland territory.

Utah Opens Market for Sturdy Trucks

Mines and Beet Fields Present Special Problem for Heavy Duty Service

SALT LAKE CITY, Oct. 30—Truck dealers in this portion of the country are of the opinion that only the most sturdy of vehicles can withstand the rigors which they are put to in an ordinary day's use. This idea that sturdiness is demanded in trucks here has been promulgated by the purposes for which trucks are mainly used around Salt Lake City.

One of the greatest outlets for these vehicles here is the mining companies. In all the canyons of this valley and other valleys in the State, there are located mines now using trucks to transport ore from the mine to the refineries or smelters. The number of trucks sold to these companies would astonish the average automobile man.

In the first place, the machines are heavily loaded, many times overloaded, with crude ore, and there is no load like one of ore to test the mettle of a truck. Then the roads are the usual canyon thoroughfares, rough, steep, and during certain seasons of the year mud-bound or snow-bound. Of course a light truck, or a cheap one of corresponding materials, will not stand the strain of this endeavor, and it is the ideal and fond wish of every truck dealer in this territory to get a truck which is built to withstand the onslaughts made upon it by mining work. The price is not so important to these companies as the results.

Again, the big work for trucks here lies in hauling beets. As the mines are in the mountains so the beet fields are in the valleys, and for this latter use sturdiness is again the chief factor over speed and price or weight. The beets are hauled from the fields to the factory from one of the greatest sugar producing sections of the entire country, Salt Lake Valley and Cache Valley, at a time of the year when the weather conditions are the worst, the fall. Through mud and terrible roads these trucks plow their way, and each owner swears if he could only get a truck to hold up price would be of no concern.

KEARNS HEADS NEW COMPANY

HOLYOKE, MASS., Oct. 30—John Kearns, a former vice-president of the Fisk Rubber Co., has been named president of the newly incorporated New England Tire & Rubber Co., work on whose modern plant here is being rushed. E. J. Kearns, son of the president, was named vice-president; C. S. Huntley, treasurer and general manager, and W. C. Brunt, secretary. The stockholders have named the old board of directors. The new president is well known to the tire business, having been associated with the Fisk Rubber Co. for many years, and

is now vice-president and general manager of the Lee Tire Rubber Co. He is also chairman of the pneumatic tire division of the Rubber Association of America. Manufacture of Holyoke cord tires has already been begun in another factory under supervision of officials of the local corporation. This work will be transferred to the local factory as soon as it is completed. This is expected to be shortly after Dec. 1.

DuPont Production to Be Five Cars Daily

WILMINGTON, DEL., Nov. 1—The duPont Motors Corp., which has its headquarters here, will reach its ultimate output of duPont cars for the present in a few days, this being five machines a day. On the occasion of the moving of the car construction plant to the new buildings at Moore, Pa., there was a two-day convention here. Those in attendance represented different concerns that are handling the duPont car. There were men here from Cleveland, Kansas City, New York, Atlanta, Boston and Los Angeles.

The plants of the company are now operating full swing. Forty-five men are employed at Moore, 165 in Wilmington and 135 in Philadelphia, where bodies are made. At present the complete chassis, comprising the motor and all running parts, are manufactured in Wilmington, closed bodies in Philadelphia, open bodies in Springfield, Mass., and the upholstering, assembling and painting is done at the new plant at Moore.

HUNTER MAKES FIRST CAR

HARRISBURG, PA., Oct. 29—The first chassis of the Hunter Motor Car Co., a new industry of Harrisburg, has just been taken from the experimental shop and tested by Charles H. Hunter, president of the company. The six-cylinder motor mounted on the 121-inch chassis performed well. William Miller, chief engineer for the company, put the new machine through several more tests. The officials of the company state that as soon as the factory on Gettysburg-Harrisburg pike is complete, production will be begun at the rate of 100 cars a month. At first only the five-passenger, open car will be produced, to be followed shortly by closed models. The factory plans to start with 150 hands.

The equipment of the company, which is to sell at approximately \$2,250, will include spare tires and bumpers.

STIRLING MAKES FIRST CARS

NEWARK, N. J., Oct. 28—The Stirling Motors, Inc., has started building passenger cars. The first lot of six cars is now being assembled and production will be started within a month. For the present, manufacture will be confined to touring and roadster models, which will sell for \$2,350. The job is largely assembled from standard units and the factory is nearing completion. Offices for the present are maintained in the Prudential Building.

Price Levels Bring Buyers to Market

Falling Market Makes Credit Con- ditions Easier—Winter Busi- ness Outlook Better

(Continued from page 936)

While money still is tight there has been an undoubted easing of credit conditions. Because of the falling market loans naturally are made for shorter periods and interest rates are high. Money will become more plentiful as the winter advances. So far as the automotive industry is concerned, the comparative ease with which the larger companies have refinanced themselves has been gratifying and shows that the banks have unbounded confidence in the future of the industry.

In most cases, however, this financing has been a capitalization of inventory undertaken only to tide over a period of poor business. It will be reflected in the future earnings of the companies because the increased interest charges constitute another addition to fixed charges and provision must be made to pay the principal.

On the whole, the outlook for winter is distinctly more encouraging than it was three months ago. While a disastrous coal shortage seemed at that time to be certain, the summer season has been lengthened virtually a month by a warm October and reserve stocks now have been accumulated which make it probable that there will be an ample supply of fuel in most sections.

Transportation conditions have steadily improved and there now is comparatively little delay in the movement of freight. This is due in large part to curtailed production but a full measure of credit should be given the railway executives for pulling together as they never did before to increase efficiency.

From the viewpoint of the employer the labor situation is much more satisfactory. There has been an unmistakable downward trend in wages. Workers in some mills have gone so far as to accept a cut voluntarily to avert complete or partial closing of the plants. Individual efficiency has increased and as unemployment increases labor is showing a more conciliatory attitude.

Taking everything into consideration, industry in the United States is in a strong strategic position and the indications now are that it will recover rapidly.

TO CONFER ON HIGHWAY WORK

DETROIT, Oct. 29—University of Michigan will hold its seventh annual highway conference at Ann Arbor, Feb. 21 to 25. Lectures will be delivered by expert highway engineers and the course will be open to all highway commissioners, engineers, contractors and others interested in highway development. Detroit automobile factory executives will take a prominent part in the conference.

Special Cables

Voisin-Knight First in French Fuel Test

Unemployment Large in Paris Factories—Attempt to Copy Dodge and Ford Fail

(By Cable to AUTOMOTIVE INDUSTRIES)

PARIS, Nov. 2—French fuel consumption tests which brought 80 competitors together at Le Mans were won by a 30 hp. Voisin-Knight sedan, weighing 5321 lb. It covered 136 miles with 4.8 American gal. of gasoline. The competition was run on ordinary roads. Each machine was given a stated amount of gasoline according to engine size and weight, the winner being the one which covered the greatest distance.

The second prize went to a Chenard-Walcker pneumatic tired tractor trailer weighing 19,550 lb. which averaged 7.7 miles a gal. A four-passenger Citroen weighing 2568 lb. averaged 50.9 miles to a gal. The records of other competitors follow:

Four-cylinder 2-seated Peugeot, 76.1 miles per gal.; Ford weighing 2555 lb., 26 miles per gal. with a Claudel carbureter; open Cadillac weighing 4894 lb., 13.6 miles per gal.

The competition, which constituted part of the fetes in connection with the erection of a monument to Leon Bollee, aroused great interest in view of the high cost of gasoline in France.

According to official figures unemployment among Paris workers in the automobile industry has reached between 30 and 40 per cent. The unions say 8000 men are out of work out of a total of 35,000. The general Metal Industry Association states that 35 per cent of a total of 16,000 employees in the Paris region are now unemployed. The most general unemployment is among the pattern makers where it has reached 75 per cent.

French attempts to copy American automobiles have not been very successful. Berliet made a machine closely resembling the Dodge and Renault designed one which includes many features of the Ford. Both these types now are recognized as unsatisfactory. Berliet has produced a 16 hp. car which is being offered in preference to the copy of the Dodge, and Renault has put out a 12 hp. car to take the place of the one built along Ford lines.

With the improvement in the labor situation it now is assured that the London and Brussels shows will be held on the dates announced.

The price of the six-cylinder Lanchester chassis has been fixed at 2200 pounds sterling.

Active competition has been begun between American and English gasoline interests. The Standard Oil Co. will seek a lower retail price by instituting more modern methods of distribution. It is prepared to erect bulk storage tanks on the premises of all dealers at actual cost. Borings near Clermont Ferrand have revealed the presence of oil, with good prospects for profitable operations.

The Paris-Lyons-Mediterranean Railroad is making successful use of the Renault tank type of tractor for hauling freight cars in its yards, replacing locomotives and horses.

The Gnome-Rhone Co. has acquired all the interests in the British A. B. C. motorcycle originally produced by the Sopwith Co., which now is in liquidation.

De Palma to Drive Ballot in Grand Prix

[By Cable to AUTOMOTIVE INDUSTRIES]

PARIS, Nov. 1—After a visit to the Ballot factory, Ralph De Palma, who piloted a Ballot car last June in the Indianapolis sweepstakes, has sailed for the United States on the Imperator. During his brief visit to France he made arrangements for the 1921 racing campaign. He announced that he would drive a Ballot in the French Grand Prix. Other members of the Ballot team will include Chassagne and Boillot.

Steel works and forges in the St. Etienne district are laying off men because of the slackening in orders from automobile factories.

The Allied mission has forbidden the proposed Vienna-Munich airplane service on the ground that it would constitute a violation of the peace treaty. Three Rumpler machines have been seized in Austria. Both Germany and Austria have protested the ruling of the mission.

An automobile race for three litre cars carrying four passenger bodies has been announced for the first week of April on the Island of Corsica. The first prize will be 100,000 francs.

Packard Lowers Price on Single Six Models

DETROIT, Nov. 1—Directors of the Packard Motor Car Co. have decided to make the following reductions in the price of the new single six: Touring car and roadster, from \$3,640 to \$2,975; coupé, from \$4,835 to \$4,150; sedan, from \$4,950 to \$4,250. The directors said the reduction was due to the interest shown by the public in the new car which demonstrated that it could be marketed in large quantities. It was explained that the economies of quantity production, together with purchasing economies, would permit the lower price to be maintained. It was stated that plans for increased production would be set in motion immediately.

Railroads in Shape to Handle Shipments

Reduced Production Schedules Give Carriers Chance to Meet Heavy Winter Demands

WASHINGTON, Nov. 1—Reduced manufacturing schedules which have ensued during the readjustment period have enabled the railroads to move equipment for automobile loading to meet practically all demands. Traffic officials believe that carriers will be better situated to handle heavy winter shipments and thereby reduce the number of "drive-aways" which had been anticipated during the traffic congestion of the summer and early fall months.

W. L. Barnes, executive manager, car service division, American Railway Association, in a semi-monthly statement of traffic conditions points out that the railroads should continue the practice of loading automobile cars to automobile manufacturing territory. No cars will be moved into manufacturing territory unless specifically ordered.

The lessened demand for this type of equipment has been reflected in the statistics of freight cars on line to ownership as of Oct. 15. In Group C, which embraces automobile centers in Michigan and Ohio, 89.9 per cent of the box, automobile and furniture cars were on the lines where owned. The open top cars are used almost exclusively for the movement of coal.

Form Company to Build Steam Vehicle Line

PITTSBURGH, Nov. 3—Duncan Macdonald has resigned as president of the Gearless Motor Corp. to produce steam driven trucks, tractors and omnibuses. An extensive tract of land on the main line of the Pennsylvania railroad at Garfield, Ohio, was secured a number of months ago. The first unit of a series of modern factory buildings is now under roof and modern production machinery is being installed as rapidly as delivery can be had. Associated with Macdonald in this enterprise are men prominent in engineering and financial circles. The company is known as the Garfield Steam Truck Corp.

BULL TRACTOR TO BE SOLD

INDIANAPOLIS, Nov. 3—Harry C. Sheridan, referee in bankruptcy, to-day ordered the sale on Nov. 16 of the Bull Tractor-Madison Motors Corp. of Anderson, Ind. This action follows the filing of a petition in bankruptcy against the company in July by the Robbins Body Corp. of this city, the Dugger Coal Co. and the Sunflower Coal Co. of Dugger, Ind. Fred C. Dickson is receiver for the company, which has a factory at Madison and a warehouse at Minneapolis. Claims against the corporation aggregate \$750,000. Property is appraised at \$175,000.

Elections Expected to Brace Up Trade.

Detroit Officials See Quick Restoration of Confidence—Gradual Return, Say Others

DETROIT, Nov. 4—Belief that stabilization of business will follow the elections was expressed to-day by executives of Detroit automotive companies. A Presidential campaign always slows up industry and after it is over the country settles down to its own affairs.

"The general feeling as the result of the election already is decidedly optimistic, indicating the quick restoration of confidence," said H. M. Jewett, president of the Paige-Detroit Motor Car Co. "I believe the effect on the buying public will be demonstrated in confidence shown by an immediate upward trend in demand."

"I think the election will have an immediate effect on the restoration of business confidence, although not a revolutionary effect," was the statement of Alvin Macauley, president of the Packard Motor Car Co. "I think it will instill a degree of confidence, resulting in a better demand for automotive products that will be felt increasingly until normal conditions are restored along toward spring."

"The sentiment of the people as indicated by the vote presages a quick return of confidence and stabilization of business generally," declared G. H. Layng, vice-president of the Cadillac Motor Car Co. "We are running to capacity and not feeling the slump greatly but it has been evident for some time that the uncertainty of election was responsible for general depression. I look for a continued steady increase with the automotive industry in full vigor by early spring."

In the opinion of many of the executives the conditions which brought on the slump are too deep seated to be remedied by a mere change of political administration. Many factors combined to cause the depression and they think these can be overcome only by a strong, steady, concerted pull by business leaders.

CREDIT EASIER IN OHIO

COLUMBUS, Oct. 30—A marked easing up in money conditions as far as the automobile and motor truck industries are concerned has taken place in Columbus during the past month. The stringent money market which characterized the industry during the months of August and September has given way to a more liberal policy on the part of bankers generally. This is more apparent as time goes on and consequently there is now little complaint on the methods adopted by bankers in financing automotive agents and distributors.

Of course bankers are still discouraging dealers from taking on a heavy supply of cars, trucks or tractors under present conditions.

LOGGING ASSOCIATION FAVORS MOTORIZATION

NEW ORLEANS, Nov. 1—The Southern Logging Association devoted an entire day of its three-day session here late in October to discussion of the uses of motor trucks and tractors in the lumber industry. All mules and oxen now in use in Southern lumbering will be replaced by tractors and trucks within the next three years, was the opinion expressed by several speakers. C. P. Pellibone, of the Jordan River Lumber Co., Kiln, Miss., declared that his company is compelled to spend the equivalent of the initial cost of its tractors on repairs every ninety days, but added that the cost of operation with tractors would be cheaper than with oxen or mules, even if that much money had to be spent on repairs every forty days.

Twenty-seven Exhibits Listed for Commodore

NEW YORK, Oct. 30—Nineteen makes of automobiles, foreign and American, will be shown at the high-priced car salon in the Hotel Commodore opening Nov. 14 and continuing to the 21st. Coach work and body design will be exhibited by eight body-builders.

Included in the list of car entries to date are Brewster, Collins, Cunningham, Daniels, Delage, Lanchester, Lancia, Locomobile, Meteor, Minerva, Napier, Packard, Panhard, Pierce-Arrow, Porter, Renault, Rolls-Royce, Sunbeam and Winton.

Body builders exhibiting are Brooks-Ostruk, Fleetwood, Healey, Holbrook, C. P. Kimball, Locke, Leon Rubay and United Body Co. The Wright-Hispano engine will also be shown.

MARTIN-PARRY CUTS PRICES

INDIANAPOLIS, Nov. 1—Substantial reductions in prices on its complete line of bodies are announced by the Martin-Parry Corp. They show cuts running up to 10 per cent on complete bodies and from 10 per cent to 25 per cent on body equipment. President F. M. Small declares the reduction will mean a considerable sacrifice of immediate profits but that it is the patriotic duty of every manufacturer to do his part in meeting the demands of the buying public for lower prices and thus aid in stabilizing the commercial car industry and stimulating sales.

HYDE MISSOURI GOVERNOR

ST. LOUIS, Nov. 3—Arthur M. Hyde, Buick dealer at Trenton, Mo., Republican, has been elected governor of this state. The National Automobile Dealers Association, through Harry G. Moock, general manager, has wired its congratulations and its desire to help the new governor in carrying out his policies.

Improvement Seen by Federal Reserve

Business Revival on Firmer Basis Predicted—Price Stabilization Coming

WASHINGTON, Nov. 1—Revival of business on new and firmer conditions established through readjustment of price levels is predicted by the Federal Reserve Board to-day in an analysis of economic and financial conditions throughout the twelve Reserve districts during October. The Board believes that stabilization on a new price basis has been fairly well accomplished through a willingness of manufacturers and dealers to meet the transition. There is evidence of improvement in corporate financing, a condition which will enable manufacturers to weather the economic disturbance and proceed with a larger and more progressive schedule.

A steady improvement in the liquidity of paper indicates that the banks will be in a position where they may render financial assistance to applicants. The one great difficulty in the movement of prices to stability is "frozen inventories." The time element cannot be winked at in this phase of business, and as a result a large volume of credit is required.

The revision of automobile prices downward has affected steel producers. Knowing that it would be economically impossible to manufacture a car under the old contract prices for steel, some automobile manufacturers have persuaded producers to revise the contractual obligations. In the Philadelphia district, however, steel producers, in the main, are insisting upon the completion of contracts. Cancellations, due to price cuts on the manufactured cars, have brought but little protest from steel makers, because the lessened demand from automobile shops allows them to meet other and more insistent appeals for quick deliveries.

The Board points out its inability to estimate changes in the physical volume of business done by reporting groups of retailers and wholesalers, especially where pronounced reductions have been experienced. It is quite certain that the unsettled price situation relative to the principal crops, as well as the tendency to hold instead of marketing, has delayed full purchases by farmers. Dealers in farm power equipment and implements complain of the slackened demand for goods. The Board agents reported a tendency on the part of all retailers to reduce prices to stimulate buying.

TO ASSEMBLE LEYLAND HERE

TORONTO, ONT., Nov. 1—According to W. J. Thorold of London, England, who was a visitor to Toronto, Ont., this week, it is the intention of Leyland Motors, Ltd., of London, England, to start an assembling plant in Toronto, which will eventually develop into a plant for the manufacture of the complete car.

Studebaker Profits Stand Up in Slump

Earnings for Last Quarter \$3.51
a Share Despite Extraor-
dinary Expenses

SOUTH BEND, IND., Nov. 1—President A. R. Erskine of the Studebaker Corporation has issued the following statement in connection with the company's earnings and balance sheet for the quarter and nine months ended Sept. 30, last:

"While our sales for the third quarter exceeded those of last year by 30 per cent, our net profits are less because we have absorbed a substantial part of the abnormal expenses of preliminary production of the new plant at South Bend and made other reserves. The new plant is now on a profit making basis producing 103 cars per day which find a ready sale. We have made no curtailment in production at South Bend but instead are building up production to 150 light sixes per day and are striving to hold our operating forces intact.

"At Detroit our operations on the big sixes have been curtailed to a four-day week, as it is our policy not to overstock our dealers. On the other hand we are desirous of maintaining our working forces and avoiding unnecessary curtailment that would increase unemployment. It is in our opinion highly important that employment be afforded the workmen of the country to the fullest possible extent during the coming winter."

For the three months ended Sept. 30, Studebaker reports net profits, after Federal taxes, of \$2,286,794, equivalent after preferred dividends to \$3.51 a share earned on the \$60,000,000 common stock, as compared with \$3,006,965 or \$4.71 a share in the preceding quarter and \$3,499,906, or \$11.06 a share on the \$30,000,000 common stock in the September, 1919, quarter.

Net profits for the nine months ended with September amounted to \$9,765,851, equivalent to \$15.38 a share on the common stock after deduction of preferred dividends. This compares with \$7,023,386 or \$21.53 a share in the corresponding period of 1919.

Consolidated profit and loss account for the three months ended Sept. 30, 1920, compares with the corresponding period of the previous years as follows:

	1920	1919	Changes
Sales	\$27,823,611	\$21,148,983	+\$6,674,628
Profits	3,479,571	4,549,888	-1,070,317
Res. for cont'g & Fed. tax	1,192,777	1,049,982	+142,795
N. prof.....	\$2,286,794	\$3,499,906	-\$1,213,112

Consolidated profit and loss statement for nine months ended Sept. 30 compares as follows:

	73 1920	1919	Changes
Sales	\$27,374,153	\$48,639,097	-\$24,735,056
Profits	12,208,628	8,535,106	+3,673,522
Res. for Fed. tax	2,442,777	1,511,720	+931,057
N. prof.....	\$9,765,851	\$7,023,386	+\$2,742,465

Balance sheet of the Studebaker Cor-

poration and subsidiary companies as of Sept. 30, 1920, compares with Jan. 1, 1920, as follows:

ASSETS		
Cash	\$3,046,199	\$4,171,115
Investments	1,265,057	6,197,971
Receivables	11,038,516	11,218,360
*Inventories	30,634,021	20,607,337
Deferred charges	647,022	406,404
†Plants and prop.	34,193,042	25,706,854
Trade, name, good will, etc.	19,807,276	19,807,277
Total	\$101,732,033	\$88,115,378

LIABILITIES		
Notes payable	\$4,900,000	
Accts. payable, cur.	3,432,080	\$3,619,818
Dep. on sales contracts ..	311,050	295,646
Res. for payrolls, etc.	977,804	377,233
Res. for taxes	2,821,556	2,318,184
Miscellaneous	2,174,759	2,078,962
Preferred stock	10,260,000	10,260,000
Common stock	60,000,000	45,000,000
Res. for conting.	300,000	
Spec. surp. account.	3,645,000	3,240,000
Surplus	11,860,284	20,925,583
Total	\$101,732,033	\$88,115,378

*Includes inventories of new automobile plant at South Bend.

†Includes expenditures completing new automobile plant at South Bend.

Cincinnati Shops Hit by Industrial Slump

CINCINNATI, Oct. 30—There has been a decided slowing up of the machine tool industry, according to J. B. Doan, head of the American Tool Works and president of the Metal Trades Association of this city. The slackening up of the automotive industries and the high rate of the foreign exchange has brought many cancellations of both domestic and foreign orders to local plants, and while many of the plants still are working with an almost normal force it is predicted that they will begin laying off men in the near future. The railroads are placing some orders but not enough to promise any great amount of work.

Doan declares that the tendency is toward greater efficiency among the workers, but it is far from being up to normal.

VAN BLERCK PRICES DROP

MONROE, MICH., Nov. 1—The Van Blerck Motor Co., manufacturers of high speed marine and commercial gasoline engines, announces price reductions effective immediately which bring their products back to pre-war levels and in two instances make them lower. The 4-cylinder engine has been reduced from \$2,500 to \$2,000; the 6-cylinder from \$3,300 to \$3,150, and the 8-cylinder from \$4,200 to \$3,800. The engines manufactured in 1921 will be the same models as in 1920.

FIRESTONE DOWN ONE WEEK

AKRON, Oct. 30—The entire plant of the Firestone Tire & Rubber Co. will be closed and shut down for one week beginning Nov. 1 for the purpose of taking the annual inventory, according to official announcement. After that the entire force in Plant 2 will be concentrated on the construction of Ford sizes to fill heavy orders already placed and expected from the Ford works in Detroit.

No Sharp Price Cut Likely in England

Moderate Recessions Expected,
However—Reasons for Har-
per-Bean Reduction

LONDON, Oct. 20—(Special Correspondence)—Reductions of automobile prices in the United States have resulted in the expectation of similar action in England. It is likely there will be some cuts, but improbable that they will be large ones. Indications are that they will not exceed 7 per cent. On the other hand, some makers of large cars contemplate advances similar to that made by Rolls Royce. The companies contend they cannot afford to lower prices and their balance sheets indicate that such is the case.

The most notable price reduction in this country has been made by the Harper-Bean Co., which has cut \$500, but this is made possible in part by the fact that the company is financed by the wealthy Bean family. Another factor has been the successful introduction of American production methods, which have reduced costs and warranted search for a larger market.

Companies like the Daimler, Wolseley, Rover, Sunbeam and one or two others have considerable assets and they are not likely to dissipate them by price cuts in the present uncertain market. The Rover two-seater car with a two-cylinder horizontal air-cooled motor, selling at \$1,500, is really on the market at last and is proving entirely satisfactory.

Rolls-Royce Employs Men for Assembly Work

SPRINGFIELD, MASS., Oct. 29—With the addition of 150 skilled mechanics who have been working on the manufacture of parts since last July, Rolls-Royce of America, at its East Springfield plant, is ready to begin unit assembly in its first manufacturing schedule. It is expected that the first finished car will be ready for delivery within the next few months. Managing Director Claude Johnson of the parent British company is again at the plant with an executive of the testing and inspection division of the corporation. Products of the local plant, while primarily constructed for the American market, will also be used to relieve the Rolls-Royce plant in England of some of its burdens. The English plant is reported booked up solid on orders until well into 1922. In addition to supplying the United States market, it is expected that the local product will also be used to supply orders from the Canadian, South American and British possessions.

STUTZ PRICE INCREASED

INDIANAPOLIS, Nov. 1—Prices of all models of Stutz cars will be increased \$400, effective Nov. 20.

Government Adopts Oil Specifications

Bureau of Mines Declares S. A. E. Suggestions Scheduled to Be Incorporated

WASHINGTON, Nov. 2—New specifications for the Government purchase of gasoline, lubricating oils, kerosene, fuel oil and other petroleum products have been formulated by the technical sub-committee of the committee on standardization on petroleum specifications and forwarded to the general committee for final approval. The suggestions of representatives of the Society of Automotive Engineers made at recent public hearings will undoubtedly be incorporated in the new schedule, it was learned to-day at the Bureau of Mines.

One of the revisions will embrace tests for gasoline, in accordance with practices approved by petroleum experts and engineers. The report of the committee's action will be made public within a few days, it was said, and the issue of specifications will be known as Bulletin No. 5 of the committee on standardization of petroleum specifications.

This publication will supersede other bulletins which have been used to guide Government purchasing agents. The new bulletin will be virtually a textbook on petroleum products and will contain specific instructions to Federal purchasing agents as a new feature.

Kansas Looks Forward to Wheat Straw Fuel

TOPEKA, KAN., Nov. 1—Kansas, now the greatest wheat producing State, may become the greatest manufacturer of motor fuel from wheat straw, thus adding to the farmer's income and utilizing a product of the soil which now is virtually wasted, according to J. C. Mohler, secretary of the State Board of Agriculture.

Based on estimates of the United States Department of Agriculture that one ton of wheat straw will produce the equivalent of 40 gal. of gasoline, Kansas in 1919—with an acreage of 11,640,000—could have produced the equivalent of 46,560,000 gal., according to Secretary Mohler.

Experiments made by the Federal department show, Mohler said, that a combustible gas can be obtained from the destructive distillation of wheat straw. This new product has been used for operating an automobile, for illumination purposes and for cooking, and tests are in progress to determine its exact value and cost of production.

"If these experiments turn out satisfactorily," said Mohler, "it may not be many years before every farmer will throw the straw from his threshing machine into a still, from which he can draw all the fuel he will require to operate his farm machinery."

Farm experts have estimated that

enough wheat straw is going to waste west of the Mississippi river alone to produce in new fuel the equivalent of one-fifth the driving power of all gasoline now manufactured.

The entire industry is watching the efforts of the Government chemists in their endeavor to make straw-fuel commercially successful. Progress to date has been considered satisfactory.

Gasoline Stock Drops to 18 Days' Supply

WASHINGTON, Oct. 28—Gasoline consumption reached unprecedented proportions during August, according to refinery statistics compiled by the Bureau of Mines to-day. The stocks of gasoline at the refineries on Aug. 31 amounted to eighteen days' supply, as compared with thirty-three days' supply last year and twenty-three days' in 1918, the period when the gasoline shortage was regarded as acute. This latest depletion resulted despite the fact that production was the highest of the year during August with a daily average of 14,327,143 gal., an increase of 4,000,000 gal. over the same period last year and in 1918.

The total production of gasoline for August amounted to 444,141,422 gal. The total stocks at the end of August were 323,239,991 gal., as against 434,531,446 gal. in August, 1919, and 285,446,538 in 1918. Stocks of lubricating oil were also below the supply for August of last year when 170,572,819 gal. were on hand and only 130,797,810 for the same period this year.

INTERLOCKING BUYS PLANT

YOUNGSTOWN, O., Oct. 30—Negotiations by the Interlocking Cord Tire Co. of Akron for the purchase of the plant and business of the Trumbull Tire & Rubber Co. of Newton Falls have been completed it was declared at Newton Falls offices of the company. It is understood that another rubber goods plant in Canton will become the property of the Interlocking Cord Tire Co. within a short time, increase of the capital stock from \$1,000,000 to \$5,000,000 being made for the purpose of acquiring the Newton Falls and Canton properties.

GILLETTE RUBBER RESUMES

EAU CLAIRE, WIS., Nov. 1—The Gillette Rubber Co. has resumed operations after suspending production for about two weeks, during which inventories were taken and readjustments made by which creditors accepted an extension agreement for the payment of claims to April 5, 1921. For the present the company will employ only a part of its facilities, but will take on additional operatives as demand for tires warrants increased output.

G. M. C. OFFICIAL DIES

NEW YORK, Nov. 1—Dr. Walter Guy Hudson, medical director of the General Motors Corp., and an expert as to safeguards in the use of explosives, died suddenly yesterday at his home in Yonkers.

Tunnel Ventilation Found Practicable

Bureau of Mines Declares Exhaust Gases Not Serious Handicap to Projects

WASHINGTON, Oct. 29—Data on the tests of about 100 different motor vehicles connected at the Pittsburgh laboratories of the Bureau of Mines to determine the amount and composition of exhaust gases will be submitted to the New York-New Jersey Bridge and Tunnel Commission at an early date. The investigation was undertaken under a co-operative agreement for the purpose of ascertaining the effect of carbon monoxide thrown off by motor vehicles which would use the proposed Hudson river tunnel.

The tests on automobiles were carried out at Pittsburgh under the immediate direction of A. C. Fieldner, supervising chemist. The physiological effects of the exhaust gases were investigated at Yale University by Dr. Yandell Henderson, consulting physiologist of the Bureau of Mines. One of the outstanding facts of the inquiry was the conclusion that the tunnel could be as easily and as satisfactorily ventilated as any mine. The problem has resolved itself into a plan for the dilution and sweeping away of the deleterious gases, particularly the deadly carbon monoxide from the exhaust of engines.

The tests were based on a careful study of the character of traffic. Estimates were obtained as to the number of motor trucks and passenger cars which cross the Hudson on ferries daily and allowances made for any appreciable increase which would follow the construction of a tunnel, a more convenient means of crossing.

The Bureau of Mines has determined the maximum amount of carbon monoxide which can be breathed with impunity and the amount of gas given off by motor vehicles under varying loads. A summary of these findings will be forwarded to the joint commission by Nov. 1.

Can Perfect Ventilators

With these two important factors determined, the engineers in charge of the tunnel project will be in a position to perfect mechanical appliances which will produce the necessary movement of air and the direction of the current. The bureau believes the general designs tentatively adopted by the tunnel commissions will be adequate for the expected density of traffic.

The findings of the Government agency in this connection will undoubtedly have a far-reaching effect. It has been reported that several similar projects are contemplated in California and Colorado though these proposed tunnels would be through mountains instead of under water. The conclusions reached in this latest inquiry will also have an effect on ventilation of large garages.

INDUSTRIAL NOTES

Longdin & Bruegger Co., Fond du Lac, Wis., manufacturer of "Close-Tite" winter body attachments for open touring cars and roadsters, has increased its working force and extended the daily working schedule to 10 hours in order to keep pace with bookings. C. H. Bruegger has returned from a trip to call on jobbers in Minneapolis, Kansas City, Des Moines and Wichita, and reported conditions in the enclosed body market favorable to the extent of warranting immediate resumption of maximum production.

Zwebell Bros., Milwaukee, manufacturers of patented steam vulcanizing and retreading machinery and other tire repair equipment, have selected Schleisingsville, Wis., near Milwaukee, as the site of a manufacturing plant. The first unit will be 60 x 100 ft., and equipped as a machine and assembling shop. Later a foundry unit will be added.

Highway Trailer Co., Edgerton, Wis., has reduced its working schedule to eight hours a day for five days a week as a temporary measure made necessary by the non-shipment of materials as well as the obstacles offered to the marketing of the production at the full capacity effected during the last six months following extensive enlargement.

Cleveland Tractor Co. of Canada, Ltd., is moving its head office from Windsor, Ont., to Montreal, Can. It has been decided that Montreal is a better distributing centre for Eastern Canada than Windsor. The establishment of the Western branch at Regina, Sask., enables it to give service in Western Canada.

Baldwin Lumber Co., West Allis, suburb of Milwaukee, has changed its corporate style to Baldwin Battery Box Co. For some time the millwork plant has been devoted mainly to the manufacture of containers for storage battery cells and this will be made the principal product henceforth.

The Western Malleables Co. of Beaver Dam, Wis., having a separate plant for the production of light automotive malleables, has resumed the operation of the sixth furnace, placing the entire casting facilities at work after a light run and part-operation during the summer months.

Field Body Corp., Owasso, has completed plans for the opening of a branch station close to the Ford factory in Highland Park where Ford trucks will be equipped with bodies obviating the necessity of shipment or drives to the body plant.

Ford Motor Co. is soon to undertake an extensive exploratory movement for iron ore. Only one mine has ever been developed on the lands recently purchased by the company in the Michigan peninsula, and this one is idle.

Bay Rubber Co., Milwaukee, has been organized with an authorized capitalization of \$675,000 to manufacture rubber products generally. The incorporators are E. J. Larson, William Eickhoff and H. P. Hemsing.

Acme Works, Inc., Indianapolis, has started work on a new foundry. Upon the completion of it the company will enlarge its production of aluminum castings for the automobile industry.

E. W. Bliss Co., Brooklyn, has resumed operations at the Buckeye Engine Co. plant, Salem, Ohio, which it will use for the manufacture of engines.

Clark Equipment Co. has practically completed its Battle Creek plant and will soon start production of internal gear drive motor truck axles.

Electric Alloy Steel Co., Charleroi, Pa., is pushing plant extensions and will go into increased production of high speed steels in the Spring.

Willard Automobile Storage Battery Co., Cleveland, has purchased land at Toronto, Ont., and plans the erection of a \$500,000 plant.

Phoenix Tube Co., Warren, Ohio, will triple its plant facilities by March 1. Branch offices are to be established in Chicago by Jan. 1.

Buckeye Jack Co., Alliance, Ohio, has closed down for lack of orders and will not resume operations for at least ten days.

Reliance Elevator Co., of Chicago, has bought the plant of the Palmer Tire & Rubber Co., St. Joseph.

Smith-Waring Buys Plant for New Tractor

HARRISBURG, PA., Oct. 29—The Smith-Waring Co., organized to manufacture the Smith-Waring Tractor Cultivator, a 350-lb., 10 hp. tractor, has bought the plant of the Harrisburg Baking Co. for \$75,000 and will use it for manufacturing purposes. Minor remodeling of the structure will be begun at once.

The rough forgings for the tractors will be made in York, Pa., and some of the parts requiring forge work, in Harrisburg plants, leaving all precision work, assembling and finishing for the new factory. Eventually a force of several thousand will be employed. Production is to begin with close to 100 tractors a day, large orders for tractors already having been made.

DUNLOP TO USE ELECTRICITY

BUFFALO, Nov. 1—The \$15,000,000 plant of the Dunlop Tire & Rubber Corp. of America, which is now nearing completion, will be operated by electric power generated at Niagara Falls. The initial installation will develop 16,500 hp. In the erection of the plant the company has adopted single story construction, except in the case of the large concrete warehouse and washing and mixing shop. The fact that the plant covers 35 acres has given ample room for the development of this type of construction.

LYCOMING EXTENDS COURSES

WILLIAMSPORT, PA., Nov. 1—The Lycoming Rubber Co. will expand its course of instruction this fall and winter to include 250 executives, inspectors and foremen. Five classes a week will be conducted in the high school auditorium. Each lecture will be illustrated with motion pictures and the speakers will be rubber and tire experts from Eastern plants. These classes have been conducted for two years and have been of great benefit to employees.

WESTINGHOUSE MOVES OFFICES

NEW YORK, Nov. 1—The Westinghouse Electric & Mfg. Co. has moved the sales and service offices of the Automotive Equipment Department, previously located at New York and East Pittsburgh, respectively, to 82 Worthington Street, Springfield, Mass.

METAL MARKETS

WITH the election out of the way, more settled conditions are expected to develop in all of the metal markets. In the iron and steel industries it has for some time been the consensus of opinion that no fresh buying movement sustained by quickened consuming demand can be looked for before next spring. Much depends upon the generalship of buyers and especially of automotive purchasing agents, whether the immediate future, say the remainder of the current year, will bring forth sane readjustment of values making for all around stabilization or whether a period of intensive dullness will be followed by another market in which buyers will be swept off their feet and sellers once more the dictators. Within the next few weeks there should be revealed clearly in what commodities the market has touched bottom and the sagacious buyer will anticipate his requirements in these to a reasonable extent, so as to keep things moving. This would seem to be true at this writing of brass products, copper and zinc quotations representing actual losses to producers and brass prices being based on the cost of these two metals. In the pig iron market coke continues to act as a brake to further realignment of prices on a normal basis. "Coke Market Breaks Five Dollars" was a favorite headline for market reports in the last few days and, while it is true that furnace coke has sold at as low as \$10, compared with \$15 a few weeks ago, the far more important fact remains that coke is still selling at fully five times what it should sell at. The same interests who, in a sellers' market, control the coke situation are also the dominant factors, under like conditions, in pig iron. They are hardened campaigners against the onslaughts of buyers determined to bring about lower values. If foundries will not buy their coke at \$10 or \$12, they will not make any coke but sell their coal at \$6.50@7. What they will do when the coal market goes to smithereens as a result of their releasing so much by way of additional coal supplies, they refrain from stating. In other words, when coal declines further, we may hope to see the still inflated coke and pig iron prices shrink.

Pig Iron—Removal of the Ford tractor plant from Dearborn to River Rouge, Mich., has caused a number of automotive foundries in the Middle West to receive postponements of casting orders and the foundries are asking for suspension or postponement of pig iron shipments to them. The Illinois Steel Company has sold all the open tonnage it had for first quarter 1921 delivery at \$39, furnace base.

Steel—Further requests to suspend temporarily deliveries have been received in the Pittsburgh and Youngstown districts from automotive interests. Some of the latter have merely cut down the tonnage to be shipped weekly. Much camouflage is in evidence in connection with quotations. A Youngstown market report says that "one interest reports rejection of \$65 sheet bar offerings." Why wouldn't buyers reject such offers when the market is \$55 and no buyers at that?

Aluminum—The market is lifeless and quotably unaltered.

Copper—Some of the large producers have been letting go of metal at below 15c., in order to raise sorely needed funds. The market is demoralized.

Tin—In response to higher London cables the market is a shade improved, but consuming buyers continue apathetic. The stock of tin products, such as babbitt, is said to be depressingly heavy.

Automotive Financial Notes

Friend Motors Corp. has been granted a Wisconsin charter. The company is a Delaware corporation with main offices and factory at Pontiac, Wis. The application states that \$100,000 will be the invested capital in Wisconsin, although for the present no local office will be established within this State.

Stewart-Warner Speedometer net earnings for the third quarter, before taxes or dividends, were \$801,278, the biggest showing for any quarter this year. Total earnings for the three quarters combined were \$2,271,426. These are similar to actual earnings for corresponding periods last year.

Armstrong Foundry Co., Racine, Wis., a large manufacturer of gray iron castings for the automotive and agricultural implement industries, has increased its capitalization from \$75,000 to \$150,000, following the completion of a plant enlargement program.

Savage Arms Co. has passed the dividend on its second preferred and common stocks. Dividends of 1½ per cent have been paid on the second preferred since August, 1917, and the common dividends of a like amount have been paid since that time.

Kelly-Springfield Tire Co. for the six months ended June 30 shows net income after charges but before Federal taxes of \$2,023,104, equivalent after preferred dividends to \$7.43 a share (par \$25) on the \$5,688,082 common stock.

Explosives Trades, Ltd., will buy shares in General Motors Corp. with proceeds of issue of 8,000,000 pounds Sterling seven-year secured notes at 96½, repayable at par. The name of the company will be changed to Nobel Industries, Ltd.

Classy Automobile Deflector & Supply Co., Milwaukee, has filed articles of incorporation. The company is capitalized at \$500,000 to engage in the manufacture and sale of headlight lenses and other automotive equipment.

Paige Motor Car Co. will pay a monthly dividend of 1 per cent on Nov. 10. This is the same as paid last month, and dispels rumors that the company contemplates deferring dividends during the present dullness.

Pearce Tire & Rubber Co. stockholders will meet in Ashtabula, Ohio, Nov. 9 to act upon the agreement entered into by directors of the company by which the company would be sold to the Interlocking Cord Tire Co., Akron.

Gardner Motor Co. in a balance sheet of Sept. 30 showed net quick assets of \$1,974,000 and current liabilities, including tax reserve, of only \$71,655. The current assets included cash in excess of \$871,000.

Federal Motor Truck Co. has declared a monthly dividend of 1 per cent payable Nov. 1, Dec. 1 and Jan. 1. Former monthly dividends have been at the rate of 1½ per cent a month.

Motor Wheel Corp. has declared a cash dividend of 2 per cent on its stock payable Nov. 20. The company has no regular dividend rate.

L. C. Allen, for several years in the banking business in Chicago, has been made assistant treasurer of Briscoe Motor Corp.

Nelson Motor Truck Co., Saginaw, Mich., has increased its capital from \$500,000 to \$1,100,000 to care for plant expansion.

H. H. Franklin Mfg. Co. paid a regular quarterly dividend of 1½ per cent on its preferred stock on Nov. 1.

Maxwell-Chalmers Plan Again Delayed

NEW YORK, Nov. 3—Time for the deposit of stock, unsecured notes and claims and for the exercise of purchase rights under the plan of reorganization of the Maxwell Motor Co. and the Chalmers Motor Corp. has been extended to Nov. 15. Stockholders who failed to exercise their purchase rights and make their initial deposit by Oct. 27 will be required, however, to pay a penalty of 25 cents for each \$100 of principal. Time for filing applications for the purchase of new stock in excess of the minimum rights has been extended, without penalty, to the close of business Dec. 1.

The reorganization committee headed by Walter P. Chrysler announces that more than 85 per cent of the outstanding notes and claims already have assented to the plan and that more than 80 per cent of the outstanding Maxwell and Chalmers stock has been deposited. Practically all of the bank creditors have subscribed to the plan as well as a large number of the merchandise creditors.

Substantial progress has been made by the reorganization committee in expanding and developing the selling organization. It is stated that more than 4000 automobiles have been sold since the middle of August. Prior to that date sales of Maxwell and Chalmers cars had been at a standstill for some time.

FULTON TO BUY TIRE PLANT

NEW YORK, Nov. 3—Fulton Motors, Ltd., of Canada has been organized to take over the Denby Motor Truck Co. of Canada. Garvin Denby, president of Fulton Motors, with a plant at Farmingdale, is president of the Canadian company but is leaving the active direction of affairs to the directors in the Dominion. The company is negotiating for the purchase of the Marathon Tire Co.'s plant at St. Catharines, Ont., except for the tire making machinery. The plant will be remodeled and it is expected operations will be started in it within two months.

RECEIVERSHIP FOLLOWS SUIT

NEW YORK, Nov. 3—A receiver has been appointed for the Holmes Mfg. Co. of Shelton, Conn., against which the Cameron Motors Corp. some time ago obtained an injunction forbidding the building or selling of any air-cooled engine embodying the essential features of the product of the Cameron company.

CENTRALIZE MACHINE COMPANIES

BOSTON, Nov. 1—Further steps have been taken to centralize the production and manufacturing departments of the Reed-Prentice Co., the Becker Milling

Machine Co. and the Whitcomb-Blaisdell Machine Tool Co. F. O. Hoagland, until recently vice-president and general manager of the Hilton Machine Tool Co. of Bridgeport, has been appointed general manager of the three companies. Albert E. Newton, vice-president and general manager of the Reed-Prentice company, has resigned to devote his entire time to other interests but will remain with the company in an advisory and consulting capacity until 1922. C. E. Hildreth offered to resign as president of the Whitcomb-Blaisdell Co. some time ago but has been asked to remain.

Bank Credits

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

NEW YORK, Nov. 4—An important phase of the money market is the continued activity in new financing, both for domestic corporations and municipals and for foreign governments. A scantier supply of call money in the local market last week was evidenced in the rates, which were on the whole higher than in the previous week, the average being 8 per cent to 10 per cent, as compared with 6 per cent to 10 per cent the week before.

Nominal time loan rates were also higher, with almost no business transacted except for very short maturities. Rates on 60-90 days maturities were quoted at 7½ per cent to 8½ per cent, compared with 6 per cent to 7 per cent the previous week, with corresponding advances in rates for longer maturities.

The New York Federal Reserve Bank's ratio of reserves to deposit and note liabilities was raised last week by ½ a point from 38.6 per cent to 39.1 per cent, chiefly through the transfer of an additional \$23,000,000 of discounts to other Reserve banks. The necessity for this transfer is further evidence of the drain which is being made upon this center by the interior. Net deposits increased \$35,219,000 and Federal Reserve note circulation \$1,679,000, while cash reserves increased \$21,793,000.

The statement of the Clearing House Association revealed a material improvement in the reserve position. Loans and discounts declined \$61,749,000, net demand deposits \$3,889,000 and time deposits \$17,418,000. The item bills payable, rediscounts, etc., rose to the record amount of \$1,306,823,000. The deficit of nearly \$24,000,000 in required reserves of the previous week was overcome, leaving reserves \$13,995,000 in excess of requirements.

There was only a slight change in the technical position of the Federal Reserve Banks last week.

HUPP SHOWS NET OF \$843,535

NEW YORK, Nov. 4—The report of the Hupp Motor Car Corp. for the quarter ended Sept. 30 shows net profits after taxes of \$843,535, equivalent after preferred dividends to \$1.59 a share, par value, on the \$5,192,100 common stock.

Men of the Industry

Walden W. Shaw has resigned as president of the W. W. Shaw Corp., which operates the Yellow Cab service in Chicago and a motor vehicle manufacturing plant and will be succeeded by John Hertz, formerly vice-president and general manager, who will continue also as general manager. C. A. McCulloch, a director, was elected vice-president. Shaw resigned so that he might devote more time to his private affairs.

J. F. MacKay has resigned as secretary-treasurer of Willys-Overland, Ltd., to accept the vice-presidency and general managership of the John Morrow Screw & Nut Co., Ltd., and the vice-presidency of the Ingersoll File Co., Ltd., Ingersoll, Ont. J. Anderson Coulter, after thirty years with Morrow interests, is retiring from the presidency and is being succeeded by F. H. Deacon.

Donald Anthony, formerly salesmanager of the Locomobile interests in Philadelphia, selling Locomobiles and Mercer cars, has been promoted to the position of district manager for the entire southeast territory, and John J. Bergen, formerly special representative for Hare's Motors, Inc., has been appointed salesmanager of the Philadelphia branch.

J. F. Boyd has been placed in charge of sales of the Wetmore Reamer Co., Milwaukee, in the Chicago district. He was formerly with the Cyclops Steel Co. James J. Ward has resigned as assistant sales manager of the company to become a member of the firm of Wayman-Taylor-Ward Co., which will handle Wetmore sales in Michigan.

A. F. Alexander, for the last year manager of the Chicago district for the Owen Tire & Rubber Co., has been appointed district manager for Philadelphia of the factory branch just opened. This branch will take care of sales and distribution for the territory from the New York State line down to the Carolinas.

C. F. Hockley has been appointed president of the American Hammered Piston Ring Co., Baltimore, and Howard Bruce, chairman of the board of directors, and A. C. Bruce, vice-president. A. C. Bruce was assistant to the president of the Bartlett-Haywards Co., of which the Piston Ring company is a subsidiary.

John P. Kelley has been promoted to general sales manager of the A. O. Smith Corp., Milwaukee, succeeding James L. Sinyard, whose duties as secretary and director of the company demand his entire time. E. A. Barlow and C. W. Wright have been appointed assistant sales managers.

A. O. Eberhart, former Governor of Minnesota, has been elected a director of Stevens-Duryea, Inc., to fill one of the vacancies on the board caused by the resignations of Earl Palmer, of Memphis, and Frank F. Fish, of Chicago. The other vacancy has not been filled.

Isaac W. Hawes has left for England, where he will take charge of the introduction of the New Britain tractor to the British and continental market. He was formerly in charge of the testing department at the factory in New Britain, Conn.

Wallace C. Hood has been chosen president and general manager of the Hood Motor Truck Co., recently launched at Monroe, Mich. Other officers are: E. M. Schrauder, vice-president, and J. Golden Zabel, secretary and treasurer.

J. D. Flanagan, formerly in charge of development work at the Firestone Tire & Rubber Co., has resigned to become superintendent of the Rotary Tire & Rubber Co., Zanesville, Ohio, succeeding William Sherbondy, resigned.

M. F. Stapleton has been appointed sales representative of the Motor Wheel Corp. in Illinois, Indiana and Wisconsin. He was formerly Western sales manager of the radiator division, Marlin-Rockwell Corp.

Franklin G. Hill has retired as Eastern sales manager of the C. Kenyon Co., Brooklyn. He was formerly connected with Republic Rubber, Diamond and the Continental Couthouse company.

J. H. Kelly, of the Parker Motor Truck Co., Milwaukee, has resigned and will make his headquarters in Indianapolis. He was formerly in the sales department of the F. W. D. company.

Y. B. Jones has been placed in charge of the new Columbus branch of the Mack International Motor Truck Corp. He was formerly president and manager of the Lawrence Motor Car Co.

Charles Melhado has been appointed general sales manager of the Bethlehem Motors Corp., Allentown, Pa. He was formerly in charge of export sales for the company.

A. H. Howard, R. W. Martindale, W. B. Leonard and A. J. Wadsworth have joined the force of representatives of the Kelly Reamer Co., Cleveland.

Henry H. Edwards, vice-president of the Bantam Ball Bearing Co., has assumed the duties of general manager at the main factory in Bantam, Conn.

R. J. Fitzgerald has been appointed assistant sales manager of the McGraw Tire & Rubber Co., succeeding C. H. Mayer, resigned.

W. O. Rutherford, vice-president in charge of sales of the B. F. Goodrich Rubber Co., has been awarded a 20-year service pin.

A. Z. Polhamus has been elected president and general manager of the Visible Pump Co., of Fort Wayne, Ind.

Carl Velguth has resigned as sales and advertising manager of the John Obenberger Forge Co., Milwaukee.

A. B. Wagner has been appointed purchasing agent of the Nordyke & Marmon Co.

L. C. Allen has been appointed assistant treasurer of the Briscoe Motor Corp.

Republic Truck Lowers Indebtedness on Notes.

NEW YORK, Nov. 1.—The Republic Motor Truck Co. paid to-day \$500,000 of its \$3,000,000 outstanding 7 per cent notes. The balance sheet of the company as of June 30 last shows total current assets of \$9,179,849 and current liabilities of \$6,106,699, making a net working capital of \$3,073,228. Cash was in excess of \$1,000,000 and \$6,781,561 was represented in inventory.

The plant of the company has resumed operations after having been closed for several weeks. The schedule calls for a production of about 100 trucks a month. The supply on hand when the plant was shut down has been very largely re-

duced. Because of the general depression, however, earnings of the company for the last six months of the year will show a falling off from net earnings of \$1,741,618 before Federal taxes for the first half. The entire year is expected to show net earnings, before taxes, in excess of \$2,000,000 or approximately \$20 a share on the common stock after preferred dividends.

U. S. Chamber to Study Domestic Distribution

WASHINGTON, Nov. 2.—Appointment of Alvin E. Dodd of New York as manager of the Department of Domestic Distribution, as announced to-day, marks the inauguration of a new service by the Chamber of Commerce of the United States in which studies will be made of the field that lies between production and consumption. Organizations of dealers and distributors will be segregated from the general membership of the national body in order that the new branch may function successfully.

A departmental committee composed of from seven to fifteen business men of practical experience will serve in an advisory capacity on problems dealing with research and all forms of committee activity in the field of distribution. Dodd has been director of the Retail Research Association for several years.

LEWIS LEAVES MINES BUREAU

WASHINGTON, Nov. 1.—J. O. Lewis, chief petroleum technologist of the Bureau of Mines, has tendered his resignation to Dr. F. G. Cottrell, director, to become effective Nov. 15. Lewis will be succeeded by A. W. Ambrose, who has for some time occupied the position of superintendent of the Bureau of Mines petroleum experiment station at Bartlesville, Okla. Lewis, who has been associated with the Bureau of Mines for six years, the past two years as chief petroleum technologist, intends to enter the commercial field, specializing in recovery or reclamation work in either the eastern or the mid-continent oil fields. He was one of the first technologists to direct attention to the application of engineering methods for evaluating oil properties.

McDONALD JOINS TIMES SQUARE

NEW YORK, Nov. 1.—O. R. McDonald, for several years active in automotive equipment trade and association circles, has joined the Times Square Automobile Supply Co. as second vice-president and general manager. He was for a number of years sales manager of the equipment division of the Herring Motor Co., Des Moines, leaving there to become equipment sales manager for the Gibson Co., Indianapolis, which position he resigned to accept his new connection.

HARVESTER COUNSEL DIES

CHICAGO, Nov. 1.—Clarence Baxter Snow, general counsel for the International Harvester Co., died here yesterday.

Calendar

SHOWS

- Nov. 14-21—New York, Automobile Salon, Commodore Hotel Ballroom.
- Nov. 15-20—Chicago, Automotive Equipment Show, Coliseum, Automotive Equipment Association.
- Dec. 10-12—New York, Motor Boat Show, Grand Central Palace.
- Jan. 3-8—New York, Motor Truck Show, Motor Truck Ass'n of America, Twelfth Regiment Armory.
- Jan. 8-15—New York, National Passenger Car Show, Grand Central Palace, Auspices of N.A.C.C.
- Jan. 17-23—Milwaukee, Annual Automobile Show, Milwaukee Automotive Dealers' Ass'n.
- Jan. 22-27—San Francisco, Second Annual Pacific Coast Automotive Exposition, Auditorium.
- Jan. 22-29—Cleveland, Annual Passenger Car Show, Cleveland Mfr's & Dealers' Ass'n, Wignome Coliseum.
- Jan. 22-29—Montreal, Annual Automobile Show, Montreal Automobile Trade Ass'n, Motordrome Bldg.
- Jan. 29-Feb. 4—Chicago, National Passenger Car Show, Coliseum, Auspices of N.A.C.C.
- Feb. 5-12—Minneapolis, Annual Automobile Show, Minneapolis Automobile Trade Ass'n.
- Feb. 6-12—Columbus, National Tractor Show, Columbus Tractor & Implement Club, Ohio State Fair Grounds.
- Feb. 12-19—Kansas City, Annual Automobile Show, Kansas City Motor Car Dealers' Ass'n.
- Mar. 12-19—Boston, Annual Automobile Show, Mechanics Bldg. and South Armory.

FOREIGN SHOWS

- Nov. 4-13—London, International Motor Exhibition, Society Motor Mfr's and Traders, Ltd., Olympia and White City.
- Nov. 6-13—Christchurch, N. Z., Olympia Motors Exhibition.
- Nov. 23-Dec. 4—London, Cycle and Motorcycle Show, Cycle and Motorcycle Mfr's and Traders Union, Ltd., Olympia.
- Jan. 7—Sydney, Australian Motor Show.
- Jan. 22-29—Colombo, Ceylon Motor Show.
- Feb. 7—Delhi, India, Delhi Motor Show.

CONVENTIONS

- Nov. 9-11—Cleveland, Service Managers' Convention, National Automobile Chamber of Commerce.

- Nov. 30-Dec. 3—St. Louis, Third Annual Meeting and Exhibition, Automobile Accessories Branch, National Hardware Ass'n.
- Dec. 7-10—New York, Annual meeting American Society of Mechanical Engineers, Engineering Societies Building.
- Dec. 8-9—Cincinnati, Annual Convention, Ohio Automobile Jobbers' Association.
- Dec. 13—Washington, Convention of American Association of State Highway Officials.
- Dec. 23-30—Chicago, Annual Meeting American Society of Agricultural Engineers.
- Jan. 11-13—S. A. E. Annual Meeting, New York City.

RACES AND TOURS

- Nov. 25—Los Angeles, Thanksgiving Day Speedway Classic, Beverly Hills Speedway.

Demonstrate Tractor to Turkish Farmers

WASHINGTON, Nov. 1—The successful demonstration of an American tractor near Constantinople is described in a report by Consul Charles E. Allen, of Constantinople, to the Bureau of Foreign and Domestic Commerce. The showing was held on Sept. 23 at a farm at Topchilar, near Edirne Capu, on the edge of the Turkish capital, according to report, and involved the plowing of several different kinds of soil.

"Hundreds of farmers and capitalists were in attendance, among them being the Director of Agriculture for the vilayet of Constantinople, the director of the Ottoman Agricultural College and the director of the 'Model School,' an agricultural institution," the Consul states. "The result achieved was most excellent, and, although devoted entirely to one special make of tractor, it has undoubtedly awakened a great deal of interest in all kinds of American agricultural machinery in Turkey. The Turkish papers contain very favorable reports of the demonstration."

Coach Manufacturers Outline Activities

NEW YORK, Oct. 30—A program for future activities was outlined at the meeting of the New York Motor Coach Manufacturers Association here this week. Chief among the proposed new activities were the following:

1. Establishment of an employment clearing house to be operated by the secretary of the association.
2. Co-operative buying of materials. A committee of three was appointed to take up this proposal and advise upon ways and means of carrying it out.
3. Study of better cost keeping methods for manufacturers of the association.
4. Establishment of a training course for body workers, to be operated in conjunction with a local technical school.

The meeting was addressed by R. W. Sherman, executive editor of the Class Journal Co. Sherman said that the au-

tomobile industry was fundamentally sound, and that it was now on the upgrade again. He emphasized the important part which good merchandising methods would play in the coming months.

To Show Equipment at Roads Convention

NEW YORK, Nov. 1—Representatives of fifteen industries identified with highway construction have organized an advisory committee of manufacturers to co-operate with the American Road Builders Association in holding an exposition of highway equipment and materials in connection with the annual convention of the association in Chicago the week of Feb. 7. The industries represented include makers of all kinds of road building materials. It is estimated that upwards of \$1,000,000,000 is available annually for highway and street work.

An executive committee to represent the producers and manufacturers has been appointed, consisting of J. E. Pennybacker of the Asphalt Association; B. H. Wait of the Portland Cement Association; W. F. Chollar of the Lakewood Engineering Co.; D. C. Fenner of the International Motor Truck Co. and P. P. Sharples of the Barrett company.

SPAIN WANTS SMALL TRACTORS

WASHINGTON, Oct. 30—There is a growing demand for small tractors in Spain, according to a report from Robert Harnden, American Consul at Seville. The prosperity of the farmers indicates that they are in a position to purchase farm power equipment. Olive growers have found the small tractors very useful in tilling the orchards and a great saving through displacement of labor. American equipment is more widely preferred, though competition will develop now that European factories have resumed operations. The American tractors scored heavily in the competitive exhibitions held at Seville recently.

Elizabeth Factory Named for Chrysler

NEW YORK, Oct. 30—The following statement was issued to-day from the office of the Willys Corp.:

"Owing to John N. Willys' interest in both companies some confusion seems to exist in the trade concerning the operations of Willys-Overland and the Willys Corp. These are two separate and distinct companies. The Willys-Overland Co., as heretofore, manufactures Overland and Willys-Knight cars at the company plants at Toledo. The new plant, now rapidly nearing completion at Elizabeth, N. J., is the property of the Willys Corp., and will be known as the Chrysler Motor Co. division of Willys Corp. This will be devoted exclusively to the manufacture of the new Chrysler Six and production of these cars is scheduled in the spring of 1921.

"Building operations at the Elizabeth plant are progressing steadily and have reached huge proportions. The main assembly building, a four-story structure 1440 feet in length, is practically completed and ready for the installation of machinery. Structural iron work is up for other factory units and concrete work on the great shipping and receiving sheds was completed during the past week. It is claimed that the new plant will set aside all previous ideas in modern automotive manufacture and establish new standards in the handling of material and finished product. More than 2,000,000 sq. ft. of factory floor space will be devoted to manufacture."

FARMS INCREASE IN NUMBER

WASHINGTON, Oct. 30—There are 6,449,998 farms in the United States, the Bureau of the Census announced this week. The increase amounts to 88,496 for ten years or 1.4 per cent. Marked decreases were noted in the Eastern and Central West regions while the increases were confined principally in the Northwest, Pacific, Southwest and Southeast.

AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

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No. 20

Public at London Show Interested in Economical Car

Olympia exhibitors quickly sense changed conditions from last year, when visitors scrambled to place orders. Few important engineering changes. Thirty American manufacturers make a splendid showing.

By M. W. Bourdon*

Special Cable to AUTOMOTIVE INDUSTRIES

LONDON, Nov. 6.

THE fourteenth annual London automobile show was officially opened to the public yesterday, after a private view by the press and dealers on Thursday. The opening fell far short of last year's record attendance, but the number of cars and accessories greatly exceeds the previous highest; there is no appreciable increase in the number of Continental exhibits, despite the fact that no Paris Show will be held this year. Far more space is available this year for the exhibitors and the public, owing to the fact that the building is supplemented by the "White City," a mile and half distant. A single admission fee admits to both shows, and free motor transportation is furnished, but the public erroneously consider the White City an overflow exhibit and neglect it accordingly, although the technical interest there equals that at Olympia. Exhibitors consequently are dissatisfied.

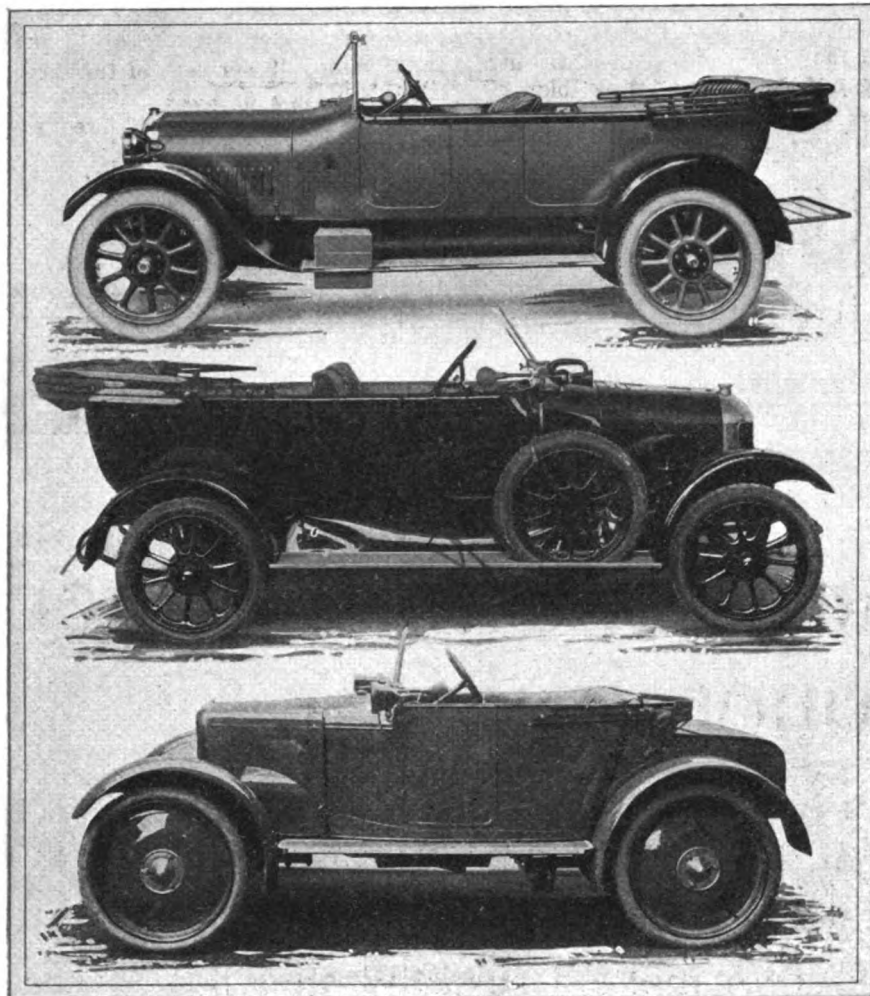
No public statement was made of the first day's aggregate attendance, but it is estimated at 15,000, which is of about the same order as the attendance at the 1913 show. Exhibitors are either anxious or

encouraged as a result of the first two days, according to the type of car staged; makers of cars up to 16 hp. selling at moderate prices report a fair business, but mostly from dealers, while private buyers still lack confidence, having anticipated widespread price reductions which have not materialized since the show opened.

There are indications of trade improvement when prices are definitely established, but nothing like last year's frantic buying is anticipated. The majority of the potential buyers are interested in small two or four-passenger cars of approximately 12 hp., endeavoring to economize in view of increased fuel prices and heavier war and income taxes. This type of car is the feature of the exhibition. Dealers in American cars report business poor, some not having sold a car in three months, but they expect an early improvement.

The Olympia staging is an improvement over any previous British show, there being wider gangways and larger stands. White City consists of several separate buildings, and the effect is poor. The senior exhibitors of all nationalities secured positions at Olympia, while the newer, smaller firms exhibit at the White City. There are 519 stands altogether, on which

*Engineering Correspondent for AUTOMOTIVE INDUSTRIES in United Kingdom.



Standard four-passenger 12-hp. Rover. Detail modifications only for 1921. Has 3 x 4½ in. four-cylinder engine, three-speed gearset, worm drive and sells at \$3,750

The Morris-Oxford four-passenger light car. Has four-cylinder 2½ x 4 in. engine, unit powerplant, three speeds helical bevel drive (4.75 to 1), 28 x 3½ in. tires and weighs 1850 lb., with 102 in. wheelbase. Sells readily at \$2,750

8-hp. air-cooled Rover with two horizontally opposed cylinders. No fan is provided, but opening in front of hood and air scoop at the sides. Has three-speed gearset and worm drive, and has attained much popularity in England. Deliveries still three months behind with output of but 20 per week. Sold at \$1,450

are shown 679 cars of 182 different makes, including 99 British, 39 French, 30 American, 8 Italian, 4 Belgian, 1 Dutch and 1 Swiss, but no German or Austrian. The American contingent includes the Briscoe, Buick, Cadillac, Dodge, Essex, Hudson, Hupp, Packard (Twin Six only), Norma, Overland, Maxwell, Chalmers, Chevrolet, Cameron, Owen Magnetic, Dixie, Dort, Haynes, King, Jordan, Mitchell, Moon, Nash, Oakland, Oldsmobile, Paige, Scripps-Booth, Velie, Willys and Allen. There is a larger number of bare chassis on American stands than was normally seen in former years. The Hudson and Essex companies exhibit direct.

There is no evidence of a general price reduction; the majority of the makers say such a thing is impossible, because the high cost of material and labor cause a tendency the other way where prices were not inflated during the boom. The most notable exception to the firmness of prices is in connection with the 25 hp. Vauxhall, in the chassis price of which there was a \$1450 drop just before the show, to \$7000. This had an immediate effect on sales. Business in many other cars is at a standstill, accentuating the depression. Other reduc-

tions just before the show include the following: The price of the Bean was dropped \$500, to \$2500; the Hillman was cut \$280; the Swift, \$250, and the Wolseley "15" four-passenger, \$140 (but the equipment furnished was reduced and this saving almost corresponds to the price reduction; this model is now priced at \$4400). The Ruston Hornsby "16" dropped \$200 and is now \$3000. The Darracq "16" chassis is \$1050 less and now is priced at \$2250. On the other hand, there also have been some increases; the Armstrong Siddeley price was raised \$240 and the Lanchester \$1500, this car selling now at \$10,500.

British design developments since the last show are very disappointing. With few exceptions, there has been no apparent endeavor to design for cheap production. Makers relied upon the strong demand continuing longer, and the majority have not yet given manufacturing costs serious consideration. This applies throughout the range, irrespective of size. Makers are not inclined to reduce the quality standard; therefore it would become necessary to concentrate next year on production costs, which in most cases means redesigning throughout. Phoenix has given a good lead in this direction, and the machine attracts more manufacturers' attention than new high priced cars, as it is recognized that the field for the latter is overcrowded and the anxiety of makers in this field is barely disguised. Efforts to improve vaporization are also disappointing, no new system being in evidence. Even hot spot manifolding has not yet been attempted seriously.

Battery ignition is not favored, as the makers believe (with some reason) that British buyers prefer and almost insist on the magneto. Central gearshift is merely tolerated. Some new designs are apparently adaptable to either central or right hand shift, having a sliding lever shaft in a gate above the gear box. There is a tendency to return to cables for brake actuation. A notable shortcoming of British cars is that

the dynamos are belt driven, 80 per cent of the two unit systems being thus fitted.

No front wheel brakes are found on British cars, not even on the highest priced models. Clincher bead tires continue to hold the field. Metal wheels occupy a strengthened position, this applying to both disk and spoked types, Austin and Vulcan being only users of wood wheels. Aluminum is used more widely, dashboards, brackets and rear axle centers being made of the light metal. There is only one more aluminum cylinder engine, on a light, semi-racing Seabrook.

No further endeavor to reduce reciprocating weights or increase engine speeds is apparent. Air cooling is increasing for light cars, but the largest British air cooled car engine is a three cylinder 3 x 3½ in. The air cooled 8 hp. Rover is in great demand. This car sells at \$1450 and the output is forty per week, being limited by the ability to obtain bodies. The largest air cooled engine is a small Cameron on a Cotay car. The English Hotchkiss company is making a small two cylinder air cooled stock engine. The only British assembled car is the Angus Sanderson. The Marlborough is assembled

from French components, and no attempt is made to compete on a price basis with American cars of the Overland type, despite the import duty. Luxury car makers show no inclination to adopt more commercial propositions. They have made no price reductions since last year. Lanchester is the only one who has increased his price, the Napier and Rolls-Royce still selling at \$10,000. Owing to the London body builders' strike, many bodies are shown unpainted and unfinished.

British designs indicate no marked extension of the use of overhead valves, though they have not been dropped by any maker who is actually in production. They are not confined to high priced models. The Phoenix is the only good example of economical design of an overhead camshaft. Buyers are generally satisfied with L heads. Unit powerplants are found as yet on only 20 per cent of British cars, but 40 per cent of the real post-war models have this feature. Side and central control are equally prevalent.

Sixes form a lower per cent, owing to the number of new makes having four cylinder engines, but no six cylinder models have been discarded. Detachable heads have not gained on a percentage basis though there is a tendency in that direction among established firms changing their design. Hollow shaft lubrication (pressure feed) shows no gain; the trough system with direct leads to the crankshaft journals is increasingly favored, while the simple trough system is losing ground. The Leyland eight is the only new car with battery ignition. Gravity fuel feed is gaining, owing to the increased number of small cars. Pressure feed is losing, while vacuum feed is stationary. Four speed gear boxes are losing slightly, approximately one-half of all the cars now having three speed transmissions. Fabric disk universals show a marked increase on all size cars. Machines with open propeller shafts (28 per cent) have them at both ends.

Spiral bevel gear final drive gained from both straight bevel and worm. The practice of fitting all brakes to the rear wheels has increased remarkably, 60 per cent of the British cars now being so fitted. However, as contrasted with the usual American practice, both sets are usually internal. Cantilever springs show a small percentage drop, while quarter elliptics are gaining in popularity on all sizes of cars, even the Leyland eight cylinder having them.

The percentage among the twos, threes and eights are as follows:

L head, 72; overhead, 20; sleeve valve, 5; inlet over exhaust, 3.

Fifty per cent of the engines with overhead valves have overhead camshafts; 60 per cent of the detachable head engines have cylinders separate from the crankcase.

Aluminum pistons are used in 26 per cent of the engines, which shows no gain over last year.

Cast iron pistons are used in 70 per cent, while the balance comes under the head of miscellaneous constructions.

Hollow shaft lubrication, 55 per cent.

Magneto ignition, 88 per cent.

Double ignition, 6 per cent.

Battery, 6 per cent.

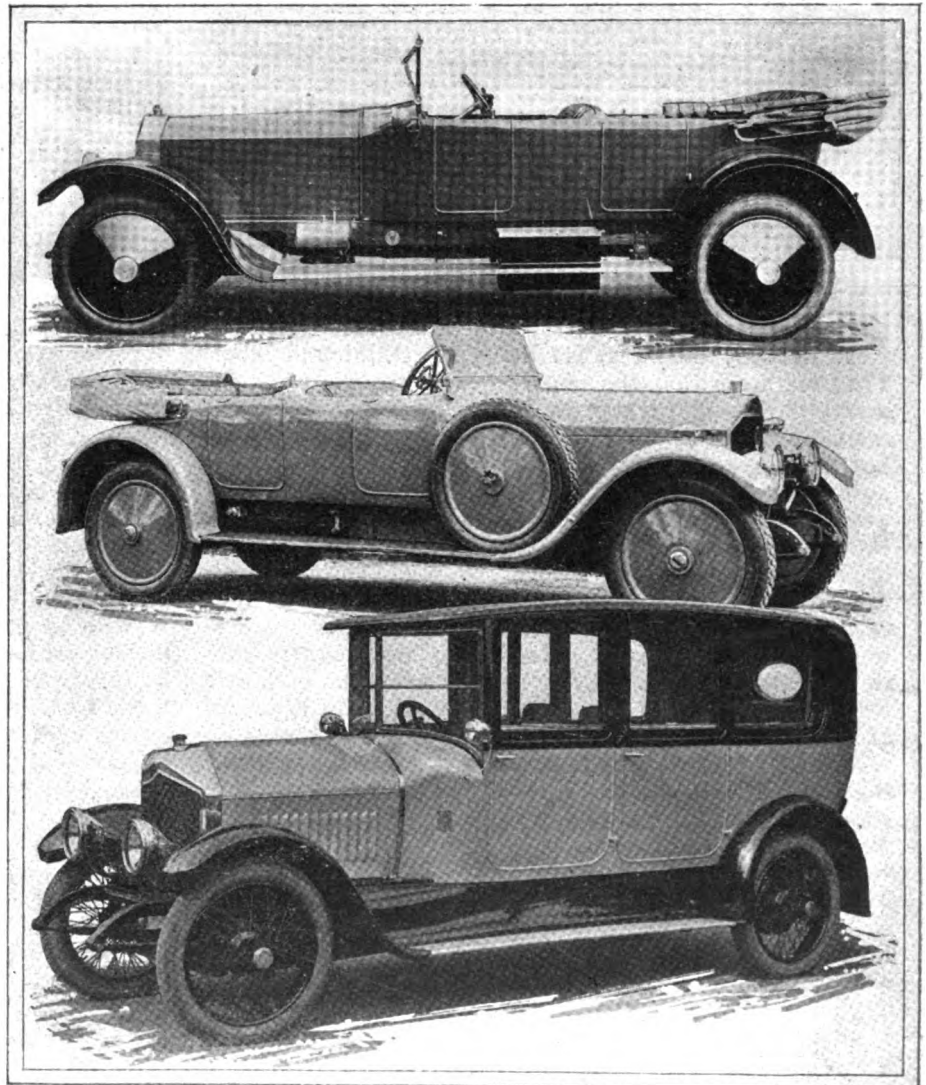
Chain distribution, 52, of which 49 per cent of the total are adjustable.

Cone clutches, 58; disk, 29 (of the latter 12 are dry multiplate, 13 mostly dry); central gearshift, 26.

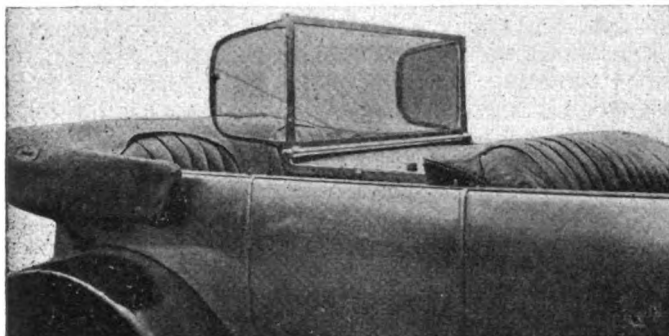
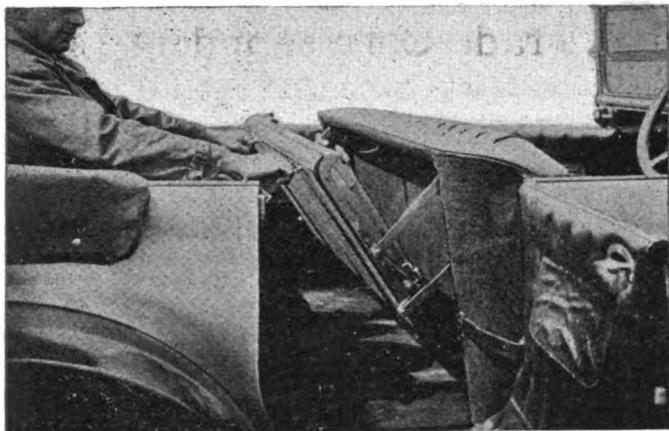
Spiral bevel final drive, 43; straight bevel, 26; worm, 20; miscellaneous, 6.

Cellular radiators, 68; thermo-siphon, 46.

Changes in Continental designs are merely a confirmation of the tendencies developed a year ago. One new firm, Darracq, has joined Delage, Hispano, Isotta and Piccard-Pictet in the use of front wheel brakes. Reports are prevalent that many other Continental firms have decided to take up front wheel brakes, some even for medium priced jobs. Overhead valves have made some progress. Gregoire has adopted Delco ignition. Unit powerplant construction has gained some ground, but no Continental maker uses the worm drive. Hotchkiss has dropped the Hotchkiss drive on a new model, on which cantilever springs are fitted. French makers are increasingly adopting cantilever springs while other Continental countries favor semi-elliptics. Metal wheels are fitted to 95 per cent of the Continental cars. These wheels show a lot of detail refinements, particularly as regards the fitments.



Rolls-Royce shown by the makers. Seats four including the driver. No alterations of note have occurred in chassis since last year 40-50 hp. six-cylinder (4x5 in.) Napier with standard type five-passenger body. Disk or wire wheels are optional Crossley seven-passenger V-front sedan



Lanchester five-passenger has folding rear wind screen which collapses to form back panel of driving seat

Lanchester rear screen extended. Forms back panel of driving seat when folded down

Italian manufacturers at the show report production now normal in their country, although a definite settlement has not been reached between capital and labor. They maintain that the importance of the disturbances was grossly exaggerated in the daily press; the great majority of the workers were opposed to violent methods but were overawed by the Red minority. The smaller automobile factories have no trouble in maintaining peace with their workers, but the very big factories find the situation more difficult.

There are few new models by well-known British manufacturers. Crossley supplements his previous four cylinder 4 x 5½-in. model with a four-cylinder 3½ x 6-in. model with detachable L head cylinders, magneto ignition, and a separate four-speed transmission. This is a high-class job and with five-passenger body is priced at \$5000.

A new supplementary Phoenix model is probably the best British production design to date. It is a four-cylinder 85 x 135 mm. (3.35 x 5.32 in.) unit power plant with overhead camshaft. Originally battery ignition was planned, but a magneto was finally adopted. The price with five-passenger touring body is \$3300. The Sheffield Simplex now has six independent 4½ x 5-in. L-head cylinders and uses the Ricardo trunk piston. The first touring car so designed has double ignition. The gearset is a unit with the torque tube at the forward end. The chassis price is \$11,000.

The makers of the Leyland truck introduced a passenger car of unusual design throughout. It has a block cast eight-cylinder-in-line engine with overhead camshaft with triple eccentric connecting rod drive. Delco ignition is used and the transmission comprises a separate gearset and a double bevel final drive. This car is priced at \$12,000. The 1921 output, consisting of only

eighteen chassis, is said to have been sold; an output of 200 is planned for 1922.

The Morris four-cylinder, 70 by 102 mm. (2¾ x 4 in.) is supplemented by a six of the same dimensions and having a unit power plant. The chassis is practically identical with that of the four, having the same wheel-base, viz., 102 in. This firm retains the magneto. Enfield dropped the five-cylinder air-cooled radial engine, which was found to be too costly, and meets the current demand with a new light four of 63 x 118 mm. cylinder dimensions (2.5 x 4.65 in.). The engine has an integral L head. This is a small four-passenger car and the price is \$2800. Standard discards the 10 hp. L head four, introducing an overhead-valve-with-push-rods type four cylinder 68 x 110 mm. engine (2 11/16 x 4 5/16 in.). It has a worm drive. A four-passenger body is fitted and the price is \$3400.

Arrol-Johnston have dropped their overhead camshaft model, which was never in production, and have resuscitated their pre-war four—an L head, 80 x 120 mm. (3.15 x 4.72 in.) unit plant construction—with modifications. Other new models are almost without exception small, light two or four-passenger cars with four cylinder L head engines of about 90 cu. in. piston displacement. Daimler, Rolls-Royce, Vauxhall, Sunbeam and Rover continue their modified 1914 models almost unchanged from last year.

The post-war overhead valve designs of Lanchester, Napier, Armstrong-Siddeley, Ensign, Straker-Squire and Wolseley show only minor variations. The Ensign is not yet in production, but the Straker-Squire and Wolseley recently commenced deliveries. Sizaire-Berwick has financial troubles and the exhibit was withdrawn at the last moment.

France is the biggest Continental exhibitor, and despite the recent labor troubles all Italian firms have their latest models on exhibition, while Switzerland, Belgium and Holland have exhibits. Nothing new has been produced by Continental manufacturers in the cheap and medium car classes. Citroen adopted right-hand drive for the British Market and dropped his prices slightly. Under American management this firm secured a strong position in the British market. Farman is in production on a high grade six and Isotta shows a high grade eight-in-line overhead valve engine.

Spa has a high class all aluminum detachable head overhead valve six cylinder chassis for the coming year. It is not on exhibition but was announced at the show. It will have front wheel brakes. The Dutch firm of Spyker exhibits a big high class six with numerous novel features. Hispano is in production on a high grade six, while Lancia decided to hold back the production of his twelve cylinder model owing to the unsettled conditions. Gregoire exhibits two new cars with detachable head, overhead valve engines.

Before the war many French makers transacted foreign business through British distributors. They now complain that, British banks having cut credits, on the order of the Government, they are seriously handicapped, as the French banks are not equipped for this class of transaction. Frenchmen express the opinion that the loss of business due to the mistake of dropping the Paris show should be retrieved by staging an exhibit next spring.

THE National Advisory Committee for Aeronautics, 2722 Navy Building, Washington, has issued a translation from the *Technische Beischte* on "Tests of a Daimler D-IV Aircraft Engine on a High Altitude Test Bench." The Committee has a limited number of copies for distribution to aircraft engineers.

Special Cable from Our London Trade Correspondent

LONDON, Nov. 6.

THIS year's motor show, in some respects, has characteristics almost opposed to last year's exhibition. Its appearance is more normal and business promises to be more stable—is less on paper. Compared with last year's attendance, Friday, the formal opening, brought out fewer people than last year's inaugural, although the number present was rated as "good."

The show is about one-third larger than last year, there being upward of 500 exhibits in all categories. About half of the exhibits are at the White City group of buildings, which is inconvenient and requires a special direct automobile service between the two sections. This arrangement is an experiment, and the change from holding the entire show in one building will be criticized by visitors, and it remains to be determined if this experiment is the solution of a lack of space for a complete show in one building. The fact that there is no French show this year must be taken into consideration as a justification of this arrangement.

Last year's show resulted in a net profit of about \$200,000, but at present the profits for this exhibition are not rated at more than half that amount, as the cost is greater and the attendance is not likely to be as good. The weather is of the typical London November sort, and such depressing conditions are always reflected in exhibitions of this kind.

Next week it is probable that some account of the business done may be obtainable, but so far no price reduction trend has developed, although a few cars are marked down slightly. Because of economic conditions, prices may be expected to harden, and on this score the delicate set-

tlement of the coal miners' strike is a factor, but it is too soon to judge the effect.

Technical novelties are few and the number of new cars are fewer than last year, excepting the changes in bodywork. The finish of work, especially of accessories, is greatly improved.

American cars make a better showing than ever before and more cars are on exhibition.

The automobiles exhibited are valued at \$10,000,000 and the individual machines range from a \$500 toy runabout to \$17,500 for a top grade salon car.

The owner driven light car models are the most popular and there is more talk of business around these exhibits. The light car is an elastic designation at present and considerable development may be expected.

The display of component parts, such as engines and gearsets, manufactured by specialists, is much greater and suggests that the economics of the assembled car are beginning to be appreciated by the British industry.

The private view of the show for dealers and the trade press was on Thursday. There was a fair attendance of dealers, but nothing developed to indicate the ideas of the dealers as to the trend of the trade for the immediate future. Some of the dealers are counting on a price drop and these are unwilling to enter into a contract. The manufacturers insist that they cannot drop under the conditions that now obtain in the industry. The views of the dealers probably will have their effect, however. Dealers call attention to the fact that the general state of trade reflects a different condition from last year, when large amounts of war profits were to be spent. This year trade must be done on a strict value for money basis.

Darracq Adopts Detachable Head

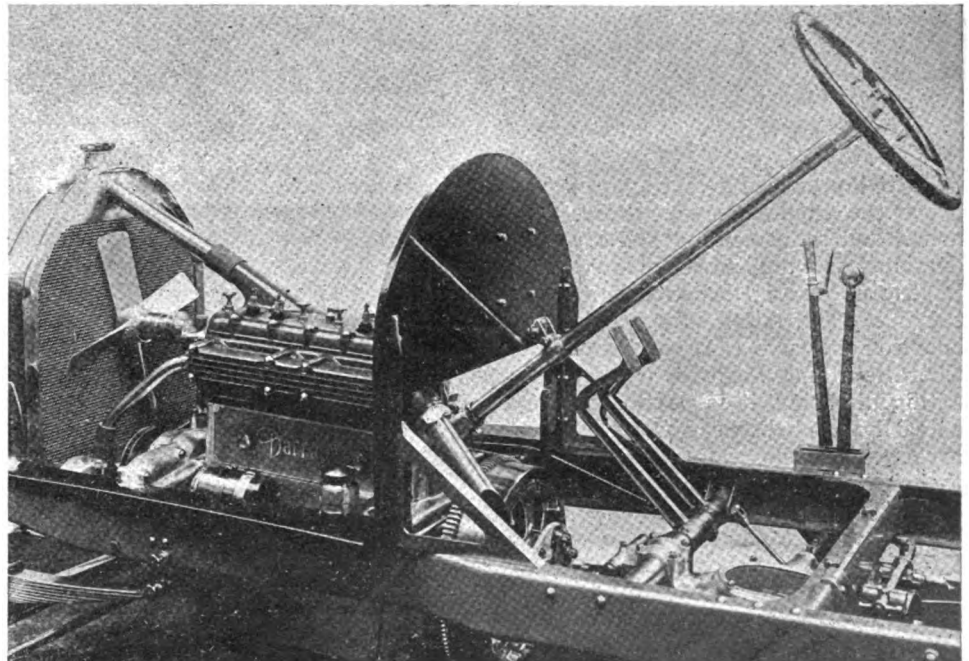
BY W. F. BRADLEY

THE French Darracq company, while intending eventually to specialize on eights, has produced a popular four cylinder model since the armistice and is continuing this for next year. The car was in production before the war, but was modified after the armistice and has a few more changes for 1921.

The engine, which has four block cylinders of 3.3 by 5.5 in. bore and stroke, now has detachable head, and the exhaust manifold, instead of being surrounded by the cooling water, is external and ribbed. The use of the detachable head is said to have added 10 per cent to the power of the engine. Another change is the use of full pressure oiling in place of pressure to the main bearings and constant level troughs to the connecting rod bearings.

The magneto has been retained on this model, although abandoned on the eight produced by the same firm. Lighting and starting is by two parts, the starting motor engaging with a ring gear cut on the open flywheel. The gearbox is a separate unit, with fabric universal

between it and the cone clutch. Final drive is by under-slung worm, with an open propeller shaft having two universals. Cantilever springs are used at the rear.



Darracq 15-hp. four-cylinder now has detachable head and external exhaust manifold

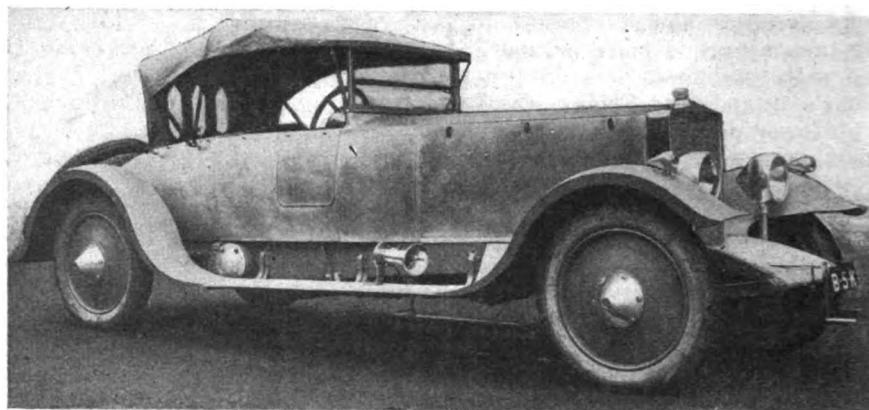
British Eight-Cylinder-in-Line Car

BY M. W. BOURDON

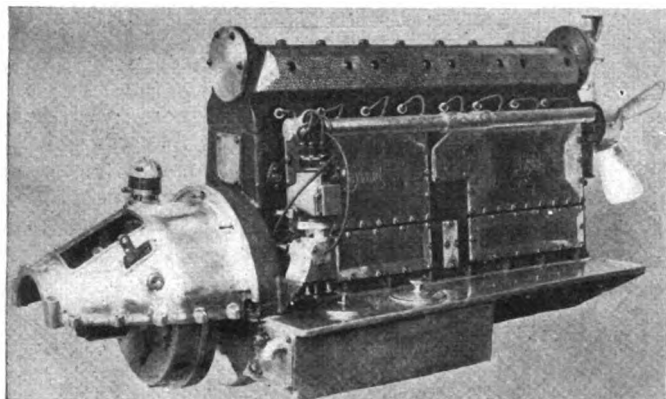
RUMOR having been busy for some months concerning an eight-cylinder car to be put forward by Leyland Motors, Ltd., Lancashire, the makers of the widely known commercial motor vehicles which have borne their name for fifteen years past, some meager details and the accompanying illustrations have been allowed to issue as a preliminary to the exhibition of the new model at the London Show in November.

As the engine view shows, the cylinders are cast as a block and in line; overhead valves and camshaft are used, with a one-piece detachable head. Ignition is by a Delco battery set; lubrication is forced throughout, the crankshaft being drilled and the connecting rods tubular; the mixture is provided by a twin Zenith carbureter.

Cylinder dimensions are $3\frac{1}{2} \times 5\frac{1}{2}$ in. and slipper type



British Leyland eight-cylinder-in-line engine car with two-seated body used during tests



British Leyland eight-cylinder-in-line engine for new car the price of which may be approximately \$15,000

aluminum pistons are used. Pump water circulation is provided, with a thermostatic temperature control.

Chassis details comprise a single disk clutch; four speed gearset separately mounted ("floating," the official bulletin terms it) with the starting motor built into the casing; twin bevel gear drive to the back axle with splayed axle shafts, the differential being located on the end of the propeller shaft. The suspension is said to be novel, embodying a "torsional anti-rolling device" applied to front and back axles.

The square appearance of radiator, hood and even the radiator filler cap is extended to the headlamps. Although the complete car shown in the photograph is a two-seater, the standard bodywork will be five-seven seated. No official announcement concerning price will be made until the show, but well-founded rumor has it that the figure will be in the neighborhood of \$15,000—so evidently one British firm, at least, holds the opinion that there is room for another super-grade luxury car on the market.

The Refined Bignan-Sport

By W. F. Bradley

FIRST produced a year ago, the Bignan-Sport presented at the London show embodies twelve months' improvements and refinements. The car, which is a French production, has a unit power plant with four cylinder 3.6×5.1 in. engine and is designed for sporting and high speed touring. The outstanding feature of the engine is the adoption of valve caps set inside the water jacket space. There is a single cap for a pair of valves, and this being of big diameter, it is possible to clean out carbon almost as easily as if the head were detachable. Because of this arrangement the water jacket head is made readily detachable. Crankshaft is carried in two plain bearings only.

Lubrication of the engine is under pressure, with an unusually large quantity of oil delivered to the bearings. Each bearing, however, is fitted with an oil collector, which returns the excess oil to the base chamber, thus preventing a smoky exhaust and reducing the amount of oil consumed. It is declared that by reason of this feature, which is patented, the oil consumption is only at the rate of one gallon for 3000 miles, at engine speeds of

not more than 1200 r.p.m.; at average engine speeds of 1200 to 1800 r.p.m. the oil consumption is at the rate of one gallon per 800 miles.

The new Bignan-Sport has been designed with a view to ease of maintenance, and the suppression of rattles which usually set up after two or three thousand miles have been covered. The cowl is a heavy aluminum casting in three parts bolted together and bolted to the frame members. It carries the support for the windscreen and can be lifted off within a quarter of an hour without interfering with the body. On the forward face of the cowl and forming part of the casting, is a horizontal dash into which is recessed, at one corner, an auxiliary oil tank, and at the opposite corner the vacuum feed tank. The oil tank, which has a capacity of practically one gallon, communicates with the base chamber, and oil can be transferred to this latter by means of a cock on the instrument board. A dial on the instrument board shows the level in the crankcase. The gasoline tank has also a shut-off cock on the feed tank. The combined breather and

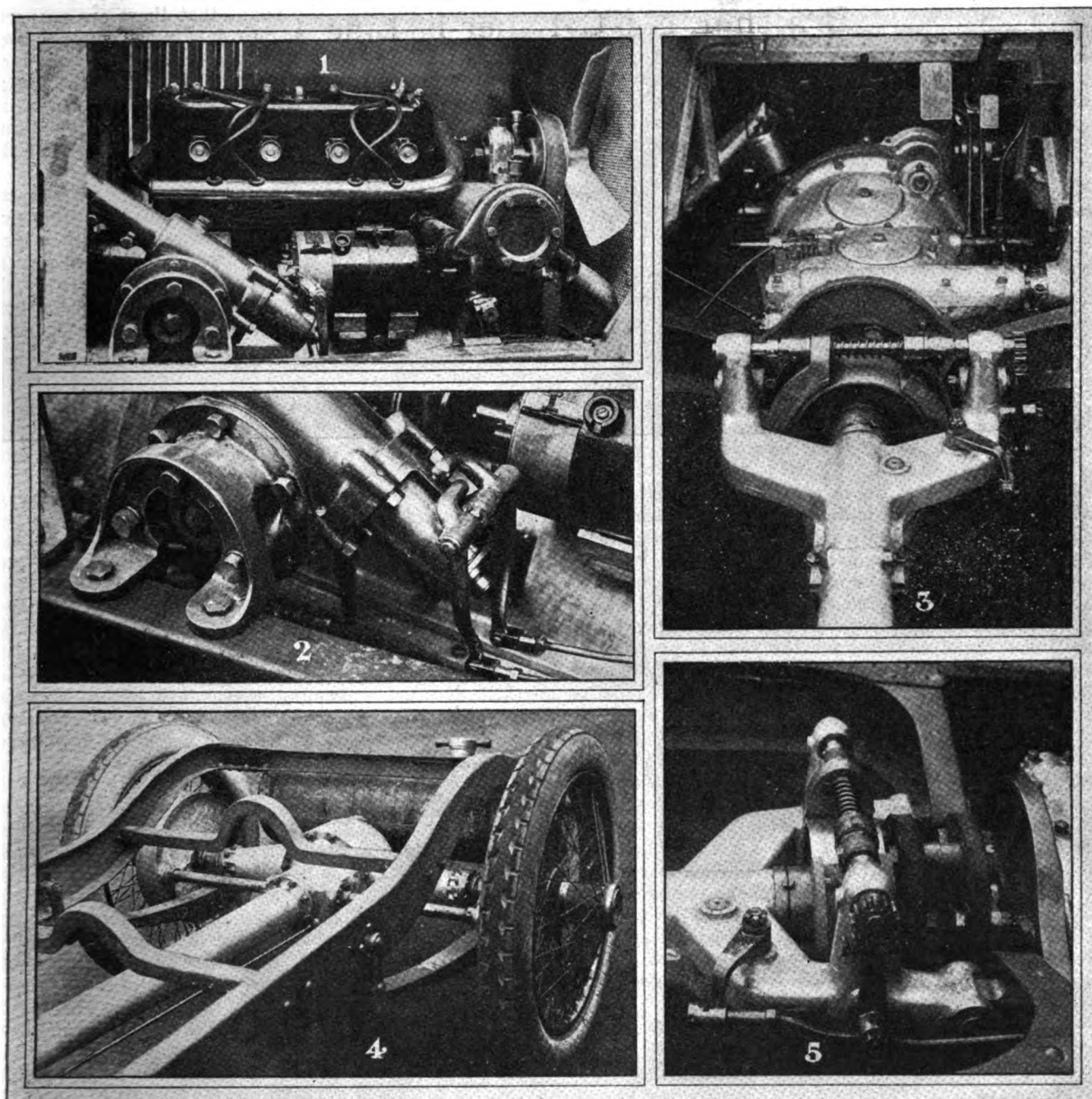


Fig. 1—Right-hand side of Bignan Sport engine, showing water pump and electric generator. Fig. 2—The steering gear on the Bignan Sport can be adjusted to any angle. Fig. 3—Bignan Sport chassis, showing the forked arms of the torque tube, external brakes and gear box. The tire pump is inside the gear box. Fig. 4—Bignan Sport rear axle. The complete absence of brake levers will be noticed. Fig. 5—Forked arms of the torque tube, showing the external brake

filler is on the valve side of the engine, the cap being held down by the head of the oil level gauge, so that the single operation of taking off the cover shows the amount of oil in the base chamber. All the gasoline and oil pipes are brought through the cowl to unions, so designed that these unions can be broken, leaving the pipes in position and allowing the cowl to be lifted off. Two electric horns, one for city and the other for road work, are mounted on the cowl, between the oil and the gasoline tanks. A polished aluminum instrument board is used and is held in position by two ebonite headed nuts. It carries the following instruments: Clock, oil pressure indicator, revolution counter, speedometer, oil level indicator, gasoline level indicator, amperemeter, starting switch and electric lighting switch.

The accessibility idea has been carried through to the body, which is so designed that it can be stripped, leaving only the bare shell in position. The floor boards are all held down by a uniform type of lock, and the seat cushions rest directly on the floor. With the removable dash, this makes it possible to remove everything in a few minutes with the exception of the body shell.

The unit power plant is attached to the frame member by two hangers at the front, and by a single point to a cross frame member at the rear. The tire pump is set inside the gearbox, and the air connection brought up to the left hand frame member. A hinged aluminum cover encloses the air connection and the lever for engaging the pump. This cover cannot be closed until the lever has been placed in neutral position.

One of the distinctive features of this car is the entire absence of external brake levers. The service brakes are on the rear wheels and the emergency brake is on the transmission. Rear wheel brake drums are cast aluminum with steel liners, their dimensions being 15.7 x 2.7 in. From the brake pedal connection is made by means of a rod to a lever mounted on a vertical axis in the right hand arm of the torque member. The brake equalizer is inside the fork arms, while the main brake rod runs underneath and parallel with the propeller shaft housing, and enters the driving pinion housing, where it is connected up to the lever mounted on the shaft carrying the two brake cams. These two shafts are in tubes, which tend to stiffen the axle housing. With this arrangement every working part connected with the brakes is enclosed and working

in a bath of oil, with the result that there are no parts liable to set up rattle and the only recall springs used are those on the brake shoes. The emergency brake is on the forward end of the propeller shaft, inside the forked arms of the torque member. In this way it relieves the universal, which is a double fabric type, of all braking stresses. Unlike the rear, the emergency brake is of the external contracting type.

The rear axle is a cast aluminum structure with forged steel liners screwed in. The propeller shaft housing and torque member is also an aluminum casting with a steel liner in the tube. All spring shackles and other similar accessories are mounted with graphite impregnated bushings; these are imported from America, the Bignan-Sport car being one of the first in France to make use of them.

New Delage Four

BY W. F. BRADLEY

DELAGE'S reappearance on the four cylinder market may be taken as an indication of the difficulty of keeping a factory in Europe running on a single type of high grade and costly automobile. In deciding to make a four, in addition to the six he has specialized on since the armistice, Delage steps into the medium class. While having two models, his policy, however, avoids any appreciable increase in overhead charges, for the four is practically identical with the six except in the number of its cylinders and the length of the chassis.

Cylinder dimensions are 3.1 by 5.9 in. The head is fixed, valves are on one side, the water pump and high tension magneto are driven off a cross shaft, and electric generator and starting motor are placed respectively on left and right hand sides, fore and aft. The oiling system is high pressure throughout. The carbureter is a Zenith with vacuum feed.

Unit construction of engine, clutch housing and gearbox is adopted, with four point attachment to the frame members. The brake and the change speed levers are mounted on a gearbox extension, quite independently of the frame members. Connection from the gearbox to the rear axle is by an exposed propeller shaft with two universals. Spiral bevel gears are used.

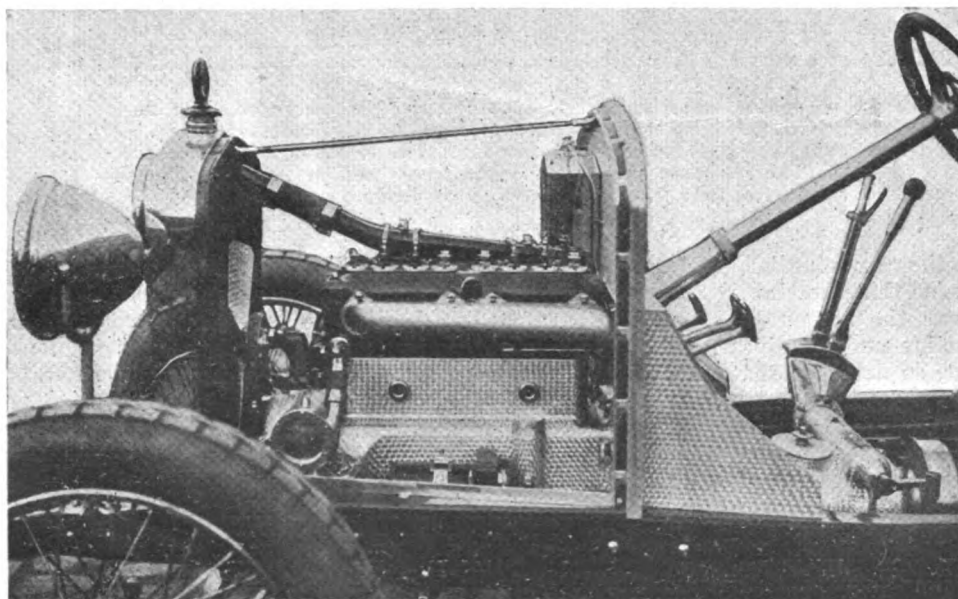
Delage was the first in France to specialize on front wheel brakes, for after using them on all his racing cars he applied them to his high class six brought out toward the end of the war. The four cylinder car, being intended to meet the medium class trade, is sold either with or without front wheel brakes. The front axle, however, has been designed as if front wheel brakes were to be used in every case, and the steering has been laid out as if brakes would be at the front. Normally the pedal operates internal expanding rear wheel brakes and the lever applies the emergency brake on the transmission. When brakes are added at the front the same pedal operates them all.

Motor Fuel Distillation from Straw

AGAS obtained by the destructive distillation of wheat, and other straw, is now being produced upon a small scale at the experimental farm of the Department of Agriculture. Several valuable by-products are obtained, such as carbon residue, suitable for the manufacture of lamp-black, potash, phosphates, and nitrogenous compounds. The tar and ammoniacal liquors are similar to those formed by the destructive distillation of coal. The results obtained

are held to be sufficient to warrant further large scale investigation, as to the possibility of designing a plant to produce the gas in sufficient quantities to allow a farmer to supply light and heat for his house, power for his stationary engines, and possibly for his tractor, from a small individual outfit.

TESTS recently made at McCook Field to determine the power absorbed by aircraft magnetos, in which a Bosch Z H-6 and a Dixie 1200 magneto were tested on a 5 hp. cradle dynamometer, showed that the power absorbed was too small to be indicated by the apparatus. The power absorbed in driving the Liberty generator ranged from 0.07 hp. at 1800 r.p.m. when delivering a current of 1 ampere, to 0.19 hp. at 3300 r.p.m. when delivering a current of 4 amperes.



Delage four-cylinder is a copy of the same maker's six-cylinder model

A Motor Bus Body with a Steel Frame

Aircraft construction is being reflected in lighter body designs for motor buses. A framework consisting of a series of uprights and cross beams of light rolled steel joined by gusset plates is the feature of the new K type London motor bus. It was built by an aircraft steel construction company.

EXPERIENCE gained during the war in aircraft construction will evidently result in important improvements in the construction of motor vehicle bodies, tending to make them much lighter than when built in the usual way. AUTOMOTIVE INDUSTRIES recently described the Goodyear plywood body for moving vans and similar vehicles. The latest development in this field is a British design of motor bus body with a frame of light built-up pressed steel members similar in form to the structural members of metal aircraft developed during the latter part of the war.

The body referred to was designed and built for the new K type London motor bus by the Aircraft Steel Construction Co. of London. The framework consists of a series of uprights and cross members of light rolled steel sections joined together by gusset plates. Details of the joints and illustrations of the three principal sections used are shown.

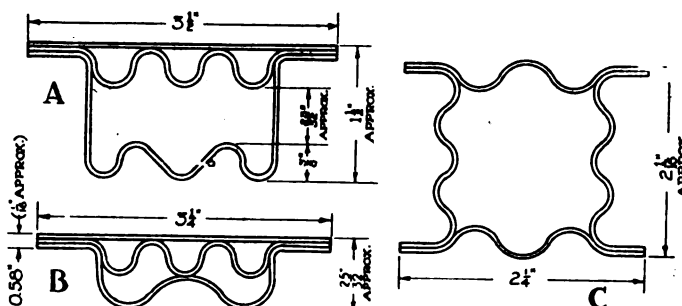
The uprights are in general of the form A, the lighter horizontal members of form B and the heavier horizontals of form C. These various sections are built up of steel strips rolled to appropriate shapes and riveted together. The thickness of material varies from No. 22 to No. 26 S.W.G. Connection to members having irregular outline is made by special straps fitting into the contour of the member and riveted in place. Members

having a flat face can be joined directly by gussets, but in all cases formed straps are fitted to reinforce the members at the joint and distribute the load which comes on at the connection.

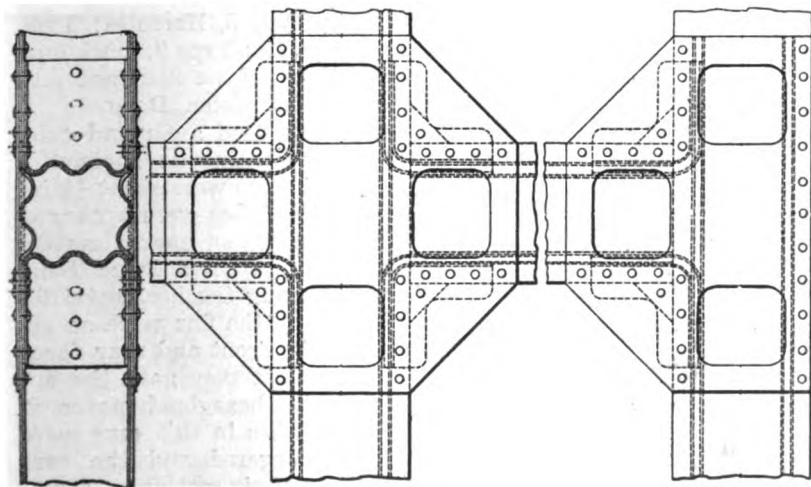
The bus has a steel roof and steel floor, and apart from the seats and smaller fittings is in its main features all-steel construction. There is, of course, nothing to prevent wood panels being fitted, and three-ply wood has been found suitable for this purpose. The steel roof as fitted to the bus with which we are dealing has, however, been entirely satisfactory. It is of 22 S.W.G. material. The floor is of 24 S.W.G. at the sides and 22 S.W.G. in the middle. It is interesting to note that the weight of the steel roof, including the supporting cross-members, is 193 lb. This compares with a corresponding figure of 244 lb. for the three-ply wood roof. The steel body all complete weighs 2140 lb. and accommodates 46 passengers.

A single-decker body of this class, to carry 32 people, and arranged with all windows to open, weighs 1800 lb., and a

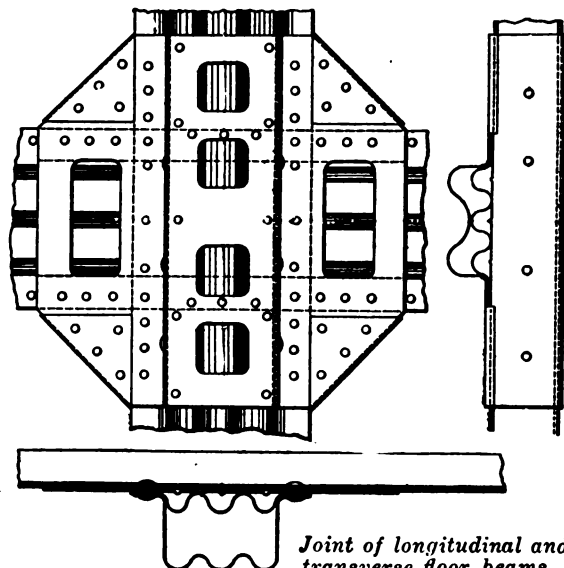
special single-decker for tropical service with all-steel parts treated with electrolytic zinc weighs 1910 lb. This latter weight compares with 3375 lb. for a standard body built in teak. It will be evident that this steel construction makes a great saving in weight possible with consequent saving in fuel consumption and tire wear.



Sections A, B and C. Section A weighs 1.43 lb. per running foot, B, 0.96 lb. and C, either 1.42 or 1.24 lb., according to gage of metal



Joints of cross member with intermediate and end upright respectively



Joint of longitudinal and transverse floor beams

Radiators and Cooling Fans on the German War Trucks

Practically all the radiators of the German war trucks brought over by the Army Motor Transport Corps contained a sheet steel shell with a ribbon type of core. Various types of fans were used, all being of comparatively large diameter. Both fans and radiators inferior to those on U. S. trucks.

By Karl F. Walker

THE Motor Transport Corps of the U. S. Army brought to this country a number of German war trucks of various makes and sizes, for the purpose of inspection, tests, etc. A comparison of these with our American-made trucks is not only interesting but most gratifying. The following facts regarding the cooling of these trucks may be of interest to those who did not have the opportunity to inspect them.

Practically all the radiators contained a sheet steel shell with a ribbon type of core. A ribbon core is that type in which the water circulates between two strips of metal soldered at their outer edge. It is quite commonly used on the American passenger cars and is often spoken of as the cellular or honeycomb type of core.

The unit construction was used almost universally. In the unit type of construction the radiator core is soldered in the shell, that is, the shell and core form a solid unit. This is the old type of radiator construction, which has proved unsatisfactory, due to the fact that any weave in the frame of the vehicle is liable to throw a twist or strain on the radiator core, thus causing leakage. It must be remembered that the metal in a ribbon core is only a few thousandths of an inch thick, and as a result is not very strong mechanically.

One or two of the radiators comprised a cast shell, which, of course, added greatly to their strength. There were only a few cast-iron, built-up jobs such as are being commonly used on the large sizes of American trucks.

Most of the cores were of the direct cooling type, where flowing water is on one side of the core metal and air on

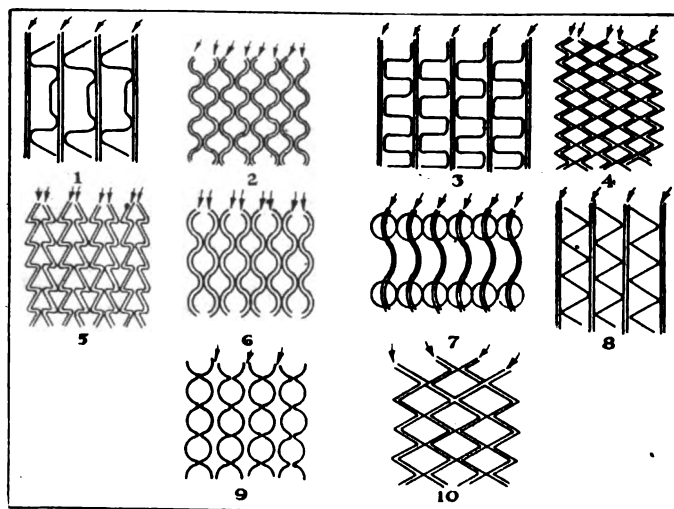


Fig. 1—Types of German war truck radiator cores

the other. Those using dead lines or indirect cooling surface used a comparatively small amount of such surface, and in all but one case these inner ribbons contained no perforations. The sketches (Fig. 1) show most of the types of cores used. These were used on the following trucks: Type 1, Bussing; Type 2, Heine-Ehrhart, Pokorny, Podena, Stoewer, Vosnag, Hansa-Lloyd, Mulag, Nacke, Bergmann and Opel; Type 3, Daimler, Saurer (small); Type 4, Dixi-Eisenach; Type 5, Hercules; Type 6, Karl Schmidt; Type 7, Durkopp; Type 8, Benz; Type 9, Graef and Stift; Type 10, Union, Daag.

The Presto used a fin and tube core of the continuous horizontal fin type. The fins were about $\frac{1}{8}$ in. apart and the tubes were arranged in straight rows on approximately $\frac{3}{8}$ in. centers. On a large Benz truck, also using the horizontal fin and tube type, the fins were so arranged at the front and rear faces of the core that they gave the appearance of a hexagon honeycomb core. The tubes in this core were arranged staggered and the core was built up of six sections. A section could be removed for repairs or replacement by removing one bolt at each end of the section.

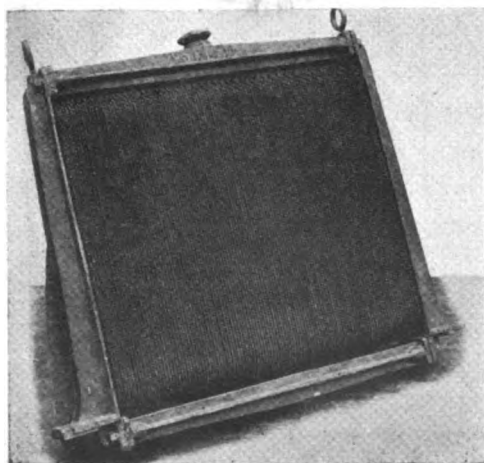


Fig. 2—Three-ton German war truck radiator

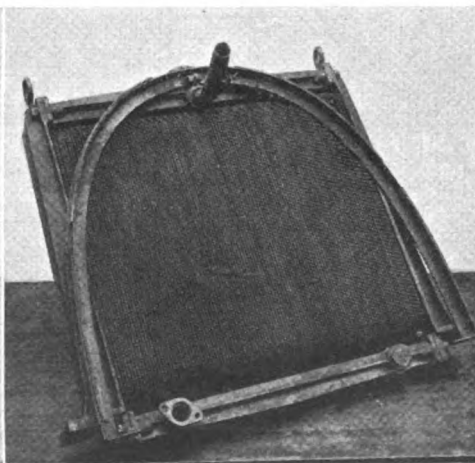


Fig. 3—Three-ton radiator

Another interesting type of core and radiator construction is shown in Figs. 2, 3 and 4. This radiator is built up in sections similar to the ordinary steam or hot water radiator used in homes. This unusual type of core and construction is only of passing interest, as it does not contain commercial possibilities of competing with the modern radiator.

The depth of the cores used on these German trucks ranged from about 4 to 6 in., the average being a trifle under 5 in. This is deeper than the average ribbon cores used on American trucks. It was also noted that the exposed frontal area of these cores was somewhat larger than commonly used on American trucks of the same size. As these cores were mostly direct cooling they would in general make better airplane cores than truck cores. They would be more efficient at high air speeds than the average American ribbon type of truck core, as there is nothing in the air passage to hinder free air flow. Therefore in airplane work their heat dissipation would be high and their head resistance low. This is probably one reason why such large radiators were needed on the trucks. The German trucks were governed down to a comparatively low speed, probably on account of the lack of rubber tire equipment, thus necessitating slow moving vehicles. Another reason was because the cooling fans, which are very essential in the proper cooling of a slow moving vehicle, were far inferior to the American designed fans.

The German cooling fans varied a great deal in their design. Some of the various types used were as follows: A narrow curved three-blade steel, a four-blade ribbed pressed steel, a narrow four-blade pressed steel, a wide curved four-blade cast aluminum, a narrow curved four-blade pressed steel with a wide rim around the periph-

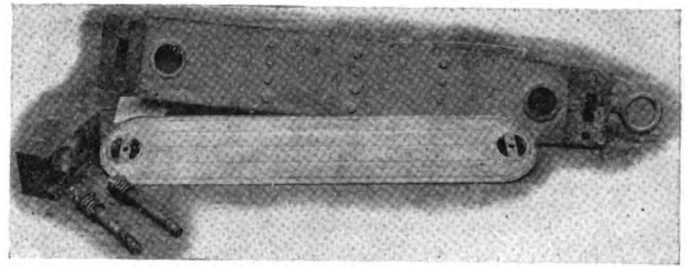


Fig. 4—Three-ton radiator details. Section of core, header, side member, hold-down bolts and block

ery, and a six-blade cast aluminum fan—six types in all.

One good feature in their design was that these fans were of somewhat larger diameter than those commonly used on American trucks, ranging in diameter from 19 to 24 in., approximately. The fan belts on all the trucks were under 2 in. in width. There were only a couple of models on which fan shrouds were used, and they were of such poor design that it is believed they were more of a hindrance than a benefit to the cooling system.

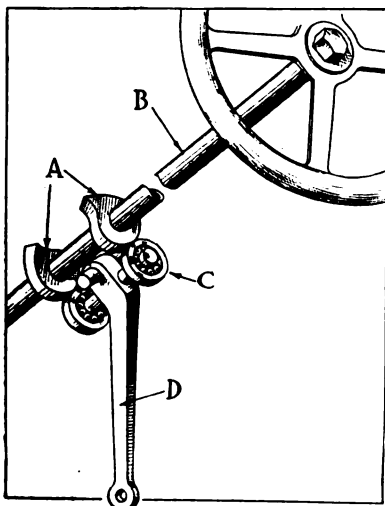
The radiators, with the possible exception of one or two, used steel tubing for the overflow. This practice, of course, was probably a case of necessity. It was further noted that the accepted practice for supporting their radiators was by using cast brackets riveted to the side of the shell.

Taking all things into consideration, the radiator construction, the type of core and the design of the fan and fan shroud used on the German war trucks were inferior to the radiator construction, cores, cooling fans and fan shrouds used on Uncle Sam's war trucks.

Marles Steering Gear

A SIMPLE form of steering gear for automobiles and motor trucks, which is said never to develop any backlash, and to operate with a very small amount of effort, has been developed in England by Henry Marles. Mr. Marles began his experimental work in the steering gear line shortly before the beginning of the war, having been previously engaged in the manufacture of ball bearings under the firm name of Ransome & Marles.

Referring to the diagrammatic illustration of the gear, at the lower end of the steering shaft there are two volute, hardened steel cams, which are formed in one piece and are spaced some distance apart. A pair of steel



Marles Steering Gear

rollers upon a shaft secured to the steering lever serves as cam followers. One of the two cams is the counterpart of the other; that is, as one cam tends to force its follower farther away from the axis of the steering shaft, the other cam allows its follower to approach nearer to the shaft. An important feature of these cams is that the rise or lift is not constant throughout. That part of the cam face which operates the gear at the straight ahead position is considerably slower in rise, so as to afford greater control of steering for high speeds, when the car is always traveling straight ahead. Less than a full turn of the hand wheel is required to move the steering wheels from full over one way to full over the other way.

The short shaft carrying the two roller followers normally lies parallel to the steering column. As the steering wheel is turned so that the upper cam tends to force the roller co-acting with it outward, or away from the steering column, the lower cam permits the roller on the lower end of the roller shaft to move inward, or toward the steering column. The rollers move with a purely rolling motion on the cam externally. Internally they move on rollers, which in their turn roll upon the rocker shaft, which in turn turns upon ball bearings. As all sliding friction is eliminated, it is claimed that no backlash will ever develop in the gear.

ACCORDING to a British contemporary, on 61 motor vehicles examined in France during the war there were sixty-five different sections of steel employed for the springs. This total lay within a range of from 1½ in. to 4 in. wide. A little standardization might profitably be considered here.

Now Is the Time for Standardization in Truck Body Measurements

This movement, which will mean so much to the sale of trucks does not involve any basic engineering problems and will not hamper originality in design. In addition to making possible a lower price, it will mean a more competent and stable body building industry.

By J. Edward Schipper

NOW that an era of price cutting has set in, in the truck industry, it should bring home to the truck manufacturer the necessity for carefully going into means of reducing the cost of manufacture. While it is true that production costs on trucks run higher per pound than on passenger cars, because of the much smaller quantities produced and a consequent increase in overhead, this is by no means the only reason why truck prices are relatively high. Probably one of the greatest factors in keeping the price as high as it is to-day, particularly in the larger capacity trucks, is the unstandardized condition of the factors which influence body mounting.

For as long a period as 10 years there have been sporadic agitations among truck manufacturers in reference to the standardization of trucks. This has been particularly true insofar as the matter affects the body builder. There is not a body maker in the business who has not received inquiries from truck manufacturers for units such as the dash, seat or cab to be made entirely of steel. In making the inquiry the truck manufacturer may specify any number from a half dozen to a thousand of these units, and generally when the price quotations are received, including as they do the necessary die equipment to make the special designs for the manufacturers, the price has always seemed high.

There has never been any real effort for manufacturers to get together on standardization of such a point as, for example, the design of dashes.

As matters now stand, it is not possible to supply, for instance, a standard seat to fit all trucks, and efforts to get the manufacturers to agree on a standard type of cab or seat have never gotten very far. At present, however, there is a real reason for getting together, inasmuch as the condition of the market clearly shows that price cutting is going to mean profit cutting to a very great degree, unless manufacturers can produce the goods for less money, and there is no quicker or more certain way of doing this than by sane, common sense standardization.

If a man buys a truck, the range of standard bodies which he should be able to get for a minimum cost and with the quickest possible delivery, should be sufficiently great for him to accommodate the needs of his business rapidly, unless he is in some very exceptional line.

There are many examples of big sheet metal workers who have been kept out of the truck body business simply for this reason. The quantities are not large enough and it would not be worth their while to go into it under present conditions. These concerns, during the war, turned out tremendous numbers of truck bodies for the

Government and did it efficiently and at a low price. Were it possible to standardize to anything like the degree made possible by the war for army work, truck manufacturers could take advantage of the lower body prices.

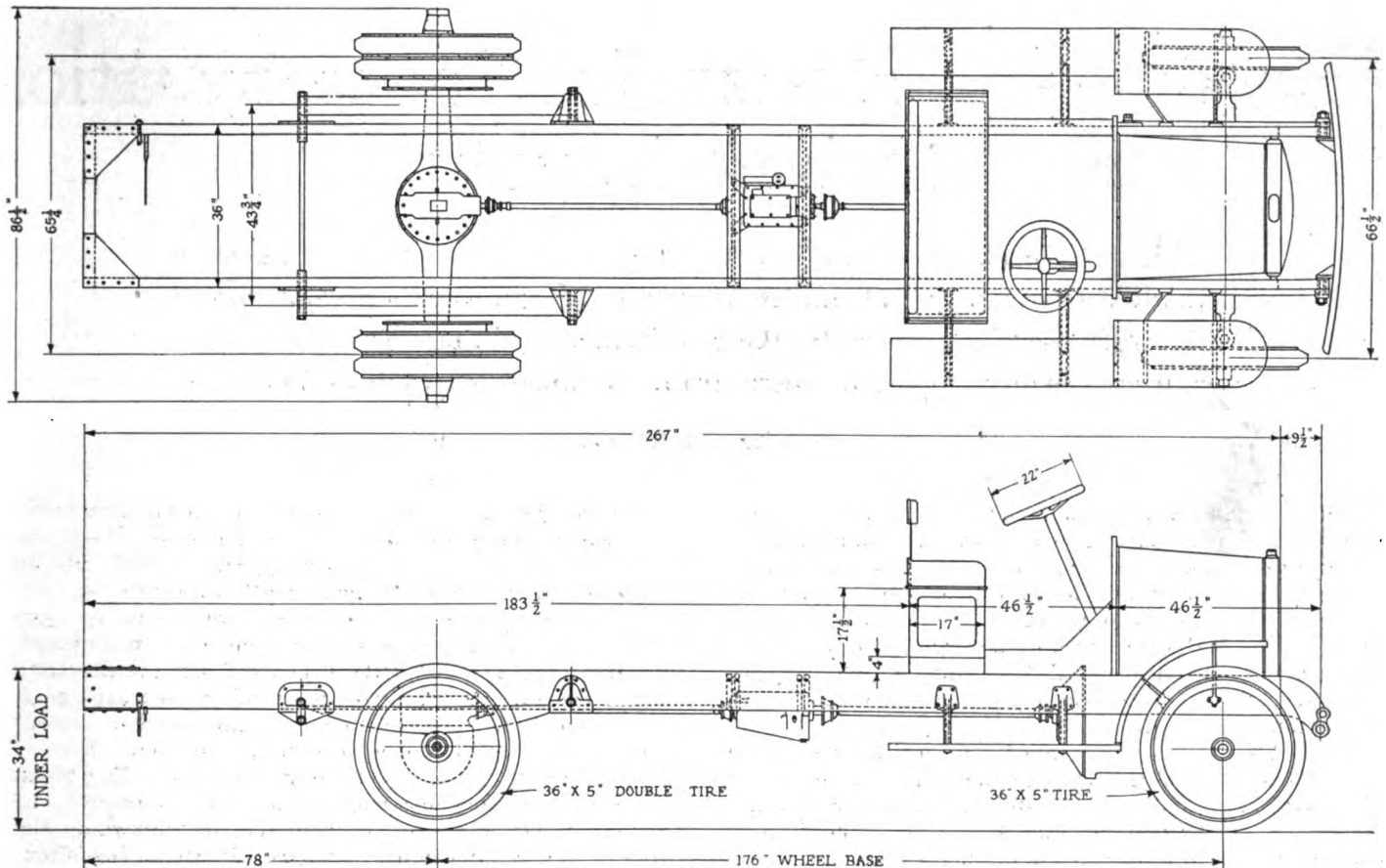
These sheet metal workers do not hesitate to state that were it possible, by means of standardization, to bring the body manufacturing business down to a production basis, they would not hesitate to go into it, and this could not fail to reduce the cost of the bodies.

A few of the points which would have to be considered would be the width of the chassis frame, location of control levers, location of the gasoline tank, location of tool box, location of steering wheel, length for driver's seat or cab from dashboard to back of seat measured from out to out. The hood ledge over which the hood fits on the dash could, of course, be varied for the different shapes of hoods, but the rest of the parts could be fairly well standardized.

Now that truck rating is up for discussion and it is very probable that in the near future we will have a greatly reduced number of ratings for trucks, with the elimination of the intermediate sizes, the opportunity is ripe to go a step ahead on the matter of standardization of the dimensions which affect body manufacture. There is rarely a problem in standardization which does not benefit the majority and penalize to some extent the minority, but where the penalization in this case would come in it is difficult to see. Surely, the truck manufacturer would profit, because his truck would reach the dealer at a lower price. The body manufacturer would profit, because he could make a manufacturing schedule which would put his plant on a real production basis, instead of on the spasmodic basis which exists at the present time, and he would also be able to manufacture his bodies more cheaply because he would be justified in going to the expense of tooling up, to some extent, for quantity production.

Under present conditions it is impossible for a body builder to start work until he knows upon what chassis his bodies are to be mounted.

Any manufacturer who builds bodies of full panel or any other style that start from the dash line, is unable to standardize on the construction until the control layout is standardized; this simply means that the whole job will have to be done approximately at one time, since all units are affected. It is a big task, but it does not present an insurmountable problem, and there should really be no need of pointing out to the people in the industry the advantage of having standardized dashes, cabs and dimensions affecting the mounting of the bodies.



A typical body dimension chassis drawing

The benefits arising from the standardization of the width of chassis frame are far reaching. This is, of course, the fundamental dimension which determines the mounting of not only the body but practically every unit in the chassis, and were the frame widths fixed for trucks of given capacities the mounting attachments for the products of the parts makers would, of course, be simplified to a single dimension for each capacity also. At the present time body makers resort to various means to meet the variations in frame widths, a number having slotted bolt holes to accommodate a range of widths.

All of this, however, interferes with the rigidity of the body fastening and also increases the cost of manufacture.

There are no basic engineering problems in the determination of a frame width, so that originality in this respect would not be stifled to any material degree. Once a logical frame width is settled, there does not seem to be any reason for objections to it, as even now the variations are not great. For in-

stance, on one truck we will find a frame 36 in. wide from outside to outside and on another, 38. If both frames were 37 in. wide neither manufacturer would be adversely affected.

As regards the location of the control units, such as the steering wheel, shifter and brake levers, inquiry directed to manufacturers of trucks has indicated very little objection to establishing a standard on these points. In fact, if all of the matters to be standardized are taken up and discussed one by one, none of them presents any big problem other than that of getting manufacturers to agree to a good, useful practice. With the industry in the present slack condition, this is an ideal time to carry out this work. Production is not being rushed at any point, and while it is, of course, not to be hoped that a standard adopted now would be universal in a year, there is good reason to believe that co-operation could make it practically universal within two years. The matter should be taken up as soon as possible.

New Piston and Ring Construction

HARRY B. JOHNSTON of Seattle, Wash., has invented a new piston and ring construction for which he claims a much better sealing effect than is obtained with ordinary piston rings. Only two rings are used per cylinder, both above the piston pin, the upper one being depended on chiefly to seal the cylinder during the power stroke, and the lower one, during the suction stroke. The upper ring has an inclined lower wall and is located in a groove of corresponding section. A portion of the upper land of the piston is cut away, to place the ring groove in communication with the com-

bustion chamber. The result is that any gas pressure in the cylinder forces the ring downward against the inclined surface of the groove and also outward against the cylinder wall. The rings are made with only a minimum of initial pressure, to just keep them against the cylinder wall. Thus the ring pressure varies directly with the gas pressure which it is desired to seal. An inclination of 35 deg. was found best for the inclined surface of the ring. Tests are said to have shown a material increase in power when Johnston pistons and rings were substituted for stock parts.

Economy of Horizontal Space by the Machine Layout

In this description of a section of the Holley carbureter factory, there is a marked lesson in the advantage of arranging light work on a continuous table, with machines spaced by the requirements of the workmen. With operations properly spaced, entire group becomes a practical machine.

By J. Edward Schipper

IN the manufacture of small parts, some problems are presented which are in every way as complex as in the larger units. In fact, on account of the greater number of units handled in a given length of time, the necessity of continuity and speed is augmented considerably. In the Holley carbureter factory the problem has been solved in a manner which should be generally applicable to the manufacture of small parts, weighing up to as much as 75 pounds.

Fundamentally, the principle is the utilization of the vertical space in the factory and the conservation of the more costly horizontal space. By the use of vertical machinery of the drill press type, it has been possible to concentrate manufacture to such a degree that a tremendous number of units can be manufactured in a very limited amount of floor space.

The layout, which is shown in Fig. 1, is a typical unit. In this row of drill presses arranged on a continuous table, it is possible to turn out 150 Holley mixing chambers per hour, or 1500 in a ten-hour day. This unit is 50 ft. in length and takes care of 36 operations, which are handled by 21 men who work side by side, standing on the wooden platform shown directly in front of the table.

A feature of this unit type of drill press installation is that only in a few instances along the line has it been necessary to make any changes in the stock heads. All of these heads have been supplied by the Avey company and they are mounted in such a way that they can be moved to any position along the line of the table. The driveshaft, as shown in Fig. 2, which is a view behind this line, is keyed so that the drive pulleys can be moved along to suit the position of the heads. The shaft is driven by electric motors placed at points along the line and this installation is such that it can be varied to suit the power demand and the convenience of the shop.

By grouping the manufacture into units of this kind, it is possible to operate them under the gang system, although the gang is a little larger than it is customary to handle in one group. If several of these units are working on one type of product, such as at the Holley plant, it is possible to operate them in competition and to arrange the compensation on a bonus system, based on proper time study. The drill heads have the advantage of being the most economical type of unit in the shop from a space standpoint.

As the heads are high and narrow, the horizontal space required along the table is not governed so much by the machines as by the requirements of elbow room for the operators who stand in line along the platform.

With this layout it makes it easy for one man to perform two or more operations on a machine, when desired. In the unit group shown in Fig. 1 with the 36 drill heads operated by 21 men, it allows approximately 2½ ft. per man along the line, which gives about as compact a layout as is practical from the man standpoint. By proper arrangement of drill heads along the line, and where necessary using two for similar operations, if that be required, it is possible with this sort of layout to get a very well-balanced production, so that there is no piling up of the material along the table. The work can be pushed from one man to the next as rapidly as each individual operation is completed, so that when the entire group is functioning properly, it gives the effect of one large machine, the movement along the line being smooth, rapid and continuous.

To give an outline of the work in this layout, it will be of interest to sketch the successive operations and the equipment required for each. As will be noted in Fig. 1, the castings for the mixing chamber come in rough at one end and leave finished at the other. The carbureter manufacture is practically completed by the making of this unit, as the remaining parts are largely products of automatic machinery. The operations are as follows:

1—Milling carbureter manifold flange. The piece is held in a rotary milling fixture of a milling machine made by the Cincinnati Pulley & Machine Co. This is a continuously rotating fixture. It holds twelve pieces. The head is the Avey No. 3 planetary type with a special attachment for the rotating table. It is provided with an end milling cutter.

2—Boring the intake end for the hot-air tube. This is done on a double jaw boring fixture operated by left and right-hand screws. The work is located from the milled flange face and the outside diameter of the intake end. The head is a No. 3 Avey.

3—Drilling the carbureter manifold flange on a multiple spindle head. Two holes are drilled. The work is located by the bore on the intake end and by the cored hole in the outlet end. There is a taper locating plug on each end of the jig for location. The head is a No. 2 semi-automatic. Operations 2 and 3 are performed by one man.

4—Boring the intake and outlet ends. The work is handled on a turn-over jig with a No. 3 plain head with power feed. The location is by means of the two flange holes and the hot air tube bore.

5—Reaming the intake and outlet ends on a stationary fixture, the mixing chamber being turned over by hand. This is done on No. 2 plain head and the operations 4 and 5 are done by one man.

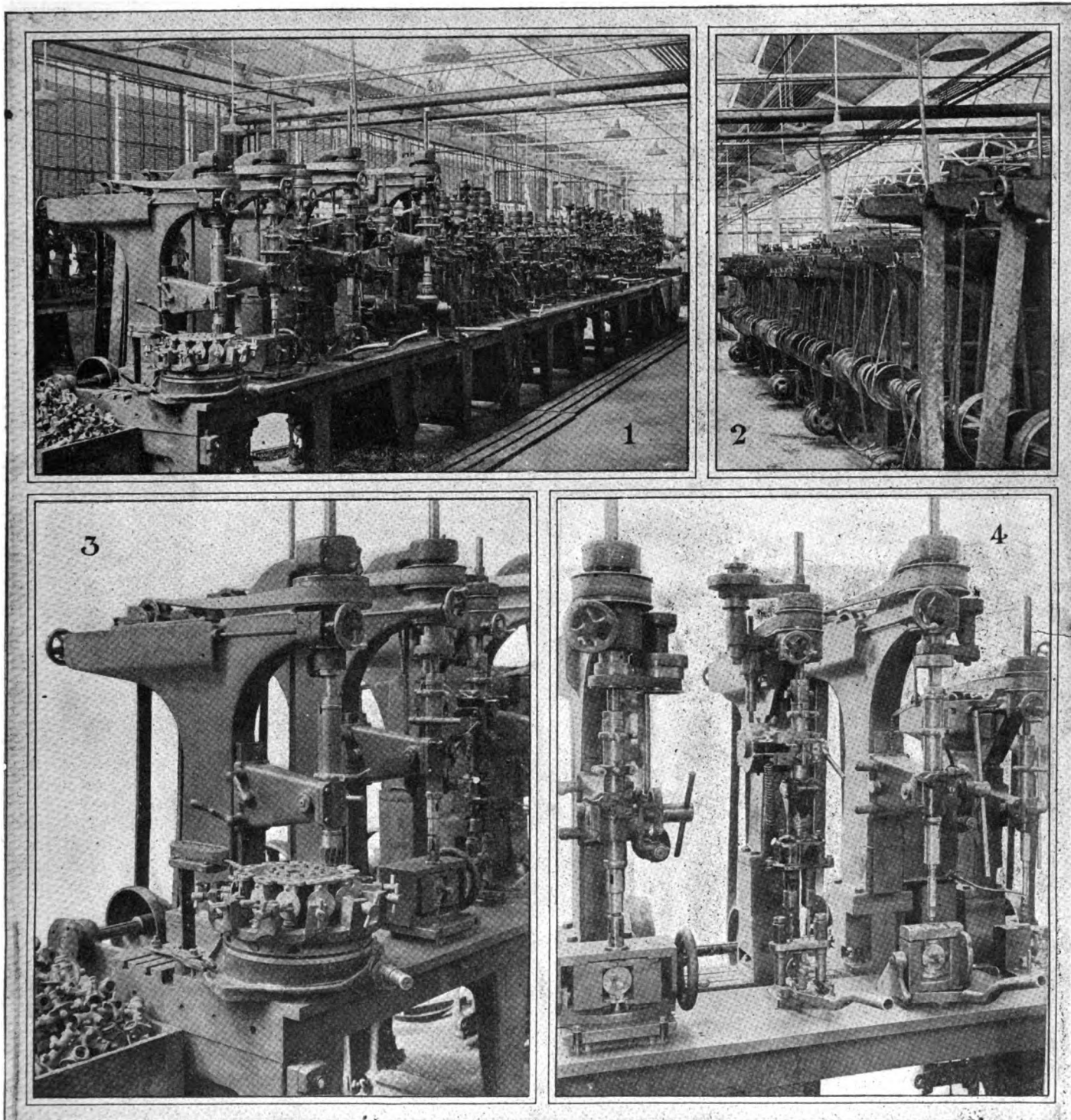


Fig. 1—Single table unit at Holley Manufacturing Co. capable of turning out 150 mixing chambers per hr. This unit is 50 ft. in length and takes care of thirty-six operations with twenty-one men. It is equipped with standard Avey drill press heads capable of being moved along the table to suitable positions for manufacture. Fig. 2—Back of Holley drill head installation, showing power drive. Shaft is provided with keyway to allow pulleys to be shifted along the line to accommodate the positions of the drill heads. Fig. 3—Operations 1, 2 and 3. Milling fixture at end is a continuously rotating type from a Cincinnati milling machine holding twelve mixing chambers at a time. Fig. 4—Operations 2, 3, 4 and 5 in the manufacture of the Holley carburetor mixing chamber

6—Rough boring the venturi on a stationary fixture consisting of an upright peg and two dowels which fit in the bolt holes. The work is done on a No. 2 semi-automatic head.

7—Facing off the bowl flange on a No. 3 head. The location is from the bore in the intake end and from the two flange holes on the outlet end. A pneumatic cylinder on the jig operates the clamping plungers and a spe-

cial facing cutter is used for this work. Operations 6 and 7 are done by one man.

8—Drilling the adjusting needle hole. This is done on a No. 2 semi-automatic head and the work is held in a pump jig locating from the bowl flange.

9—Counter-boring and facing the adjusting needle stem. Done on a No. 2 semi-automatic head with a stationary fixture locating from the bowl flange. The coun-

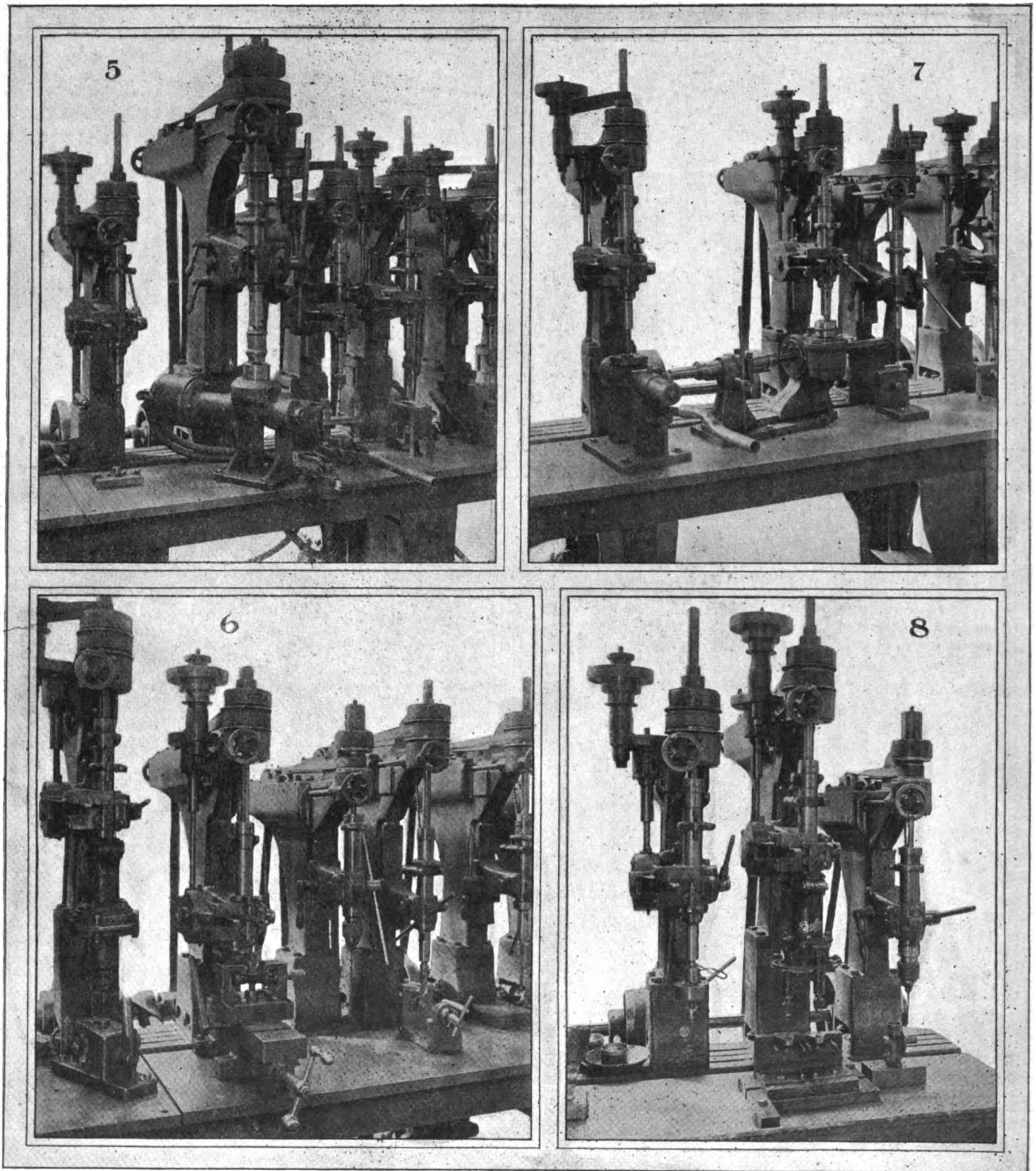


Fig. 5—Holley mixing chamber operations 6 to 10. Fig. 6—Five operations, numbers 12, 13, 14, 15 and 16, in the manufacture of the Holley mixing chamber. Fig. 7—Operations 23 to 26. The hollow milling operation shown herewith is performed on a special drilling fixture made in the Holley tool room. It is a stationary fixture with vertical and horizontal spindles operating simultaneously. Fig. 8—Last three operations in the manufacture of the Holley mixing chamber. Described in the text

ter-boring and facing operation is handled by a combination cutter. Operations 8 and 9 are done by one man.

10—Drilling the lower stem on an Avey No. 2 semi-automatic head with a special stationary fixture locating from the bowl flange and clamped vertically.

11—Counter-boring and facing the lower stem with the same kind of fixture as in 10. A combination cutter

is used on this work and the location is from the bowl flange in the same manner as operation 10. Operations 10 and 11 are performed by one man.

12—Drilling the inlet elbow hole and inlet throttle rod holes. This work is done on a No. 2 semi-automatic Avey head with a No. 2 spindle Buhr gear-driven drill head. A stationary drill jig is employed with the loca-

tion from the inlet and outlet holes and a spray needle hole. Operation 12 is handled by one man.

13—Milling the pad for the float lever bracket. This is done on a special sliding milling fixture with cross-feed and located by the bowl flange, the work being held in place with vertical pressure on the spray needle stem. This is a No. 2 head. Operation 13 is performed by one man.

14-15—Drilling inlet throttle hole and counter-boring and facing intake elbow hole on two No. 2 Avey drill heads with a loose tumble jig, locating from the intake and outlet holes and from two dowels in the bolt holes. Operations 14 and 15 are on similar machines side by side and are performed by one man.

16-17—Drilling and counter-boring the inlet seat holes on the No. 2 Avey head. A loose jig is used also for these two operations locating from the bowl flange. Operations 16 and 17 are performed by one man.

18-19—Drilling float lever bracket holes and two vent holes on No. 1½ high speed drill head, with a loose jig, which is also utilized for operations 16 and 17; that is, the loose jig is passed from 16 to 19, back and forth. Operations 18 and 19 are performed by one man.

20—Drilling primary air passage hole. A stationary jig locating from both flanges is used for No. 1½ head.

21-22—Counter-boring and tapping hole for primary air passage. This is done on two No. 2 Avey heads with a loose jig locating from both flanges. Operations 20, 21 and 22 are all performed by one man.

23-24—Hollow milling inlet and outlet throttle lever stop lug. This operation is performed on a stationary fixture with vertical and horizontal spindles working simultaneously. The fixture is a special drilling fixture made in the Holley tool room and operates with a No. 2 Avey head. Location is from a peg entering the inlet hole and on a peg and two dowels in the outlet hole and two flange holes. Operations 23 and 24 are performed by one man.

25-26—Ream and face inlet and outlet throttle rod holes and lug. This is performed in stationary jigs locating from the two ends of the mixing chamber on a No. 2 Avey drill press. Operations 25 and 26 are performed by one man.

27—Drilling low speed hole locating on outlet and outlet throttle rod hole on a stationary fixture. This is done on a No. 1½ high speed drill head by one man.

28—Ream and form venturi opening. This work is done on a No. 2 head with a pump jig locating from two flange holes and a peg in the outlet hole. Operation 28 is done by one man.

29 and 30 are similar operations to balance production speed along the line. The work is drilling the low speed holes and it is done on a loose turn-over jig on a No. 1½ Avey drill head. Operations 29 and 30 require two men.

31-32—Tapping lower stem and tapping inlet valve hole on Avey No. 2 head. The same sliding jig is used for both these operations locating from the outlet end and the two flange holes. Operations 31 and 32 are performed by the same man.

33-34—Tapping the upper stem and inlet elbow lug hole. These two operations are done on two No. 2 Avey heads with a sliding fixture taking care of both operations. The location is from the outlet hole and the two flange holes. These two operations are performed by one man.

35—Drilling the primary air passage hole in lower stem. Two pieces are done at one time on this work with a two-spindle, multiple head on a No. 2 Avey drill press.

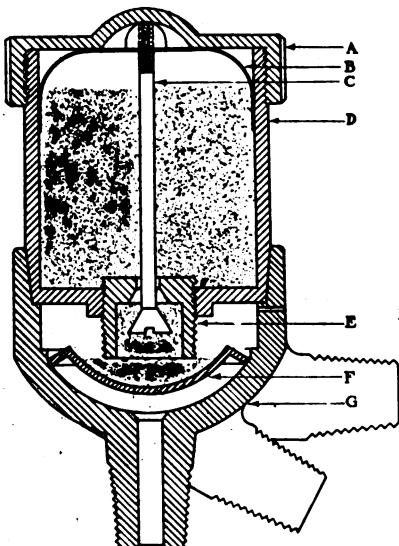
36—Reaming the primary air passage on the lower stem on a No. 2 drill head. The location is from a peg in the lower stem. Operations 35 and 36 are performed by one man.

These 36 operations, while applying, of course, strictly to this one product, nevertheless are varied enough to show that this system can be utilized for the manufacture of a great many small parts which are now made on miscellaneous types of machines of various shapes and sizes scattered over considerable area. The neatness of a plant with common table height and these closely adjacent, similar machines is noteworthy. The efficiency of handling the work in process is the most notable result. Even if it were not for the fact that this has a very large psychological effect on the work turned out, it is certainly productive of pleasing results.

The Vanoiler Automatic Oil Cup

THE illustration is a sectional view of a new automatic oil cup placed on the market by the Advanced Products Corporation. The device is known as the Vanoiler and is the invention of A. A. Van Orsdale, president of the company. For its operation the Vanoiler depends upon the vibration of the car, and its delivery of oil is said to be in direct proportion to requirements. When car is not running, lubrication ceases.

Referring to the sectional view of the Vanoiler herewith, when cap A is screwed down tightly on cup D, it presses on steel spring B, which releases valve



C and starts the oil to flow into the pan F. When the machine is at rest an automatic seal is formed, which keeps the oil from running through the bottom of the cup G. When the car is started, however, there is sufficient vibration to cause an overflow of oil from pan F, which continues as long as the car is in motion. The amount of oil fed to the bearings can be regulated by means of the adjustable centerpiece E, which can be screwed up or down, thus raising or lowering the oil level in pan F.

The chief advantage claimed for the Vanoiler is that oil is fed only while the parts are in motion; that is, while lubrication is required. Several other models, including a visible one and a battery or central reservoir model, are in process of development at the present time.

AN improved distributor for high tension ignition systems has been patented in England to M. Strobel of Frankfort-on-Main. In this both the fixed and movable distributor "points" are made of metallic tungsten, which is said to have proved most durable and reliable for the purpose. The distributor is of the open gap type, hence the points are subject to the action of the spark.

Cleaning as an Essential Manufacturing Operation

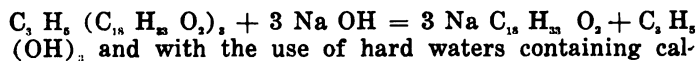
A saving of five hundred dollars a month has been effected by an Ohio truck manufacturer through improved method of cleaning materials. The following article contains an analysis of the methods used and an appraisal of their value that is worthy of special attention.

By A. W. Endter*

PRIOR to the advent of the automobile industry, manufacturers in general gave little thought to their cleaning problems and less to sanitation and working conditions. But with the entrance of this industry, upon a production basis, cleaning of parts in process, and sanitation in general, began to cause executives no little thought, mainly, at first, from an economic standpoint of dollars and cents, and secondly, to comply at least with the Inspector of Workshop's Code.

Soap and water, the product of a century before, were depended upon at this time for all cleaning processes. When they failed, lye, sal soda (Na_2CO_3) or some of the petroleum products, as benzine, gasoline, kerosene or naphtha, were employed as reserve forces.

The alkalies, the first mentioned in the above list, depended upon the use of saponifiable oils for their effectiveness, the reaction being known in soap manufacturing as saponification. The ethereal salts of the oils, known as olein, reacting with the hydroxyl radical of the alkali as follows:



cium carbonate (CaCO_3) in solution, such as we have in most manufacturing plants, the equation becomes even more complex and an insoluble soap is formed, which is very hard to remove.

As a cleaner of mineral oils from metals, the solvent properties of some of the hydrocarbons, as listed above, had long been known and, one in particular, gasoline, came into prominence at this time for several reasons. It was cheap and easy to handle, although its dangerous properties were known.

The usual method at first for cleaning with gasoline was merely to provide a bucket or, if necessary, a tank where the worker immersed the parts to be cleaned and brushed them with a stiff brush, or if cleaning small parts to use a perforated container in dipping, which allowed the gasoline and dirt to drain off.

Objections soon arose against using gasoline, primarily because of the danger of fire. Secondly, where buckets would not suffice and tanks were used, the evaporation was so great as to be expensive. Thirdly, if the gasoline was not changed frequently it became so saturated with oil that the parts would be covered with a film of oil after the gasoline evaporated, thus leaving them unfit for painting, plating or soldering. And last, the labor cost of

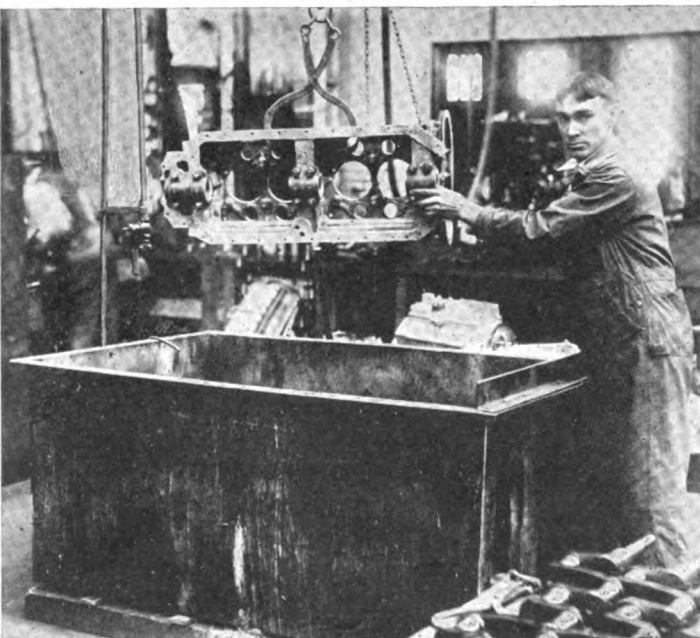


Fig. 1—Cleaning crankcase in motor assembly room for progressive truck assembly

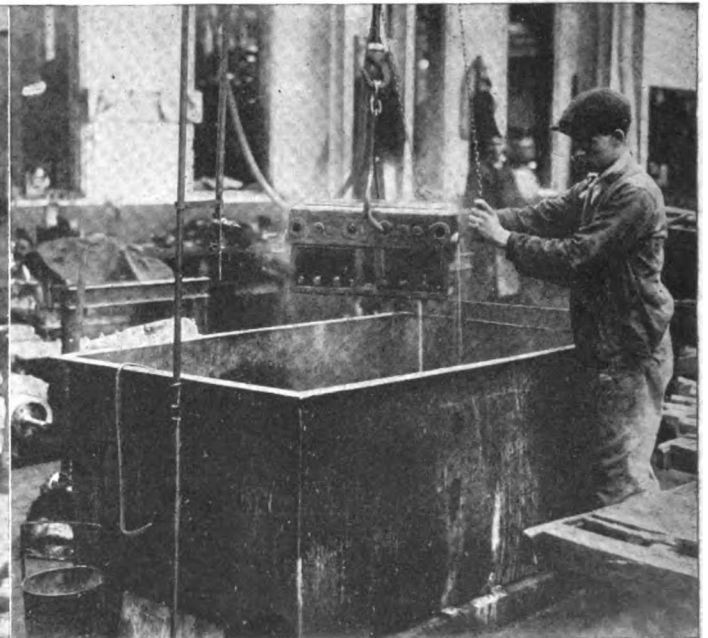


Fig. 2—Cleaning gray iron cylinder blocks for motor assembly track

hauling parts to and from the gasoline tank was enormous.

It is interesting to note the experiments undertaken by some of the older automobile concerns in further trying to adapt gasoline for cleaning purposes. Consider, as an example, one of the pioneers in the business. Finding the methods of using gasoline unsatisfactory, this firm rigged up a novel apparatus.

A gasoline tank was suspended overhead, which could be lowered by a block and tackle for refilling, and a hose connected to it and run to the workers' bench. Another hose, connected with the compressed air line, joined the gasoline hose in a double spraying nozzle. The gasoline, fed by gravity and also accelerated by the air, formed a fine mist from the nozzle, with which the work was sprayed.

This method had many advantages over the former, as the air blew the chips and dirt off after the gasoline had dissolved the film of oil; but one serious objection, not encountered before, arose. After a few hours of spraying the air in the room became so saturated with fumes that the workers complained of headaches and dizziness and upon investigation it was found that they were in a state of semi-asphyxiation. Along about this time, through the experiments conducted by a certain chemical company, cleaning problems had been analyzed and solved on a scientific basis. So successful were the results in all departments that we immediately adopted them throughout the plant.

To enumerate all the cleaning operations in which we have been successful would be beyond the scope of this paper, and we shall mention, therefore, only the most important and typical.

In Fig. 1 will be seen the cleaning of an aluminum crankcase in the motor assembly room. Here we have a metal tank of approximately 340 gallons capacity which usually contains 225 gallons of water cleaning solution. The solution is heated by a gas burner underneath the tank and the temperature maintained at 150° F. The crankcase, after the bearings are scraped in, proceeds down the track (seen in the rear of the picture) and as it reaches the tank is grabbed by a pair of tongs, lifted by an overhead air-hoist attached to a roller conveyor and moved to the tank. Several dippings suffice to clean off all chips and oil and the case is replaced on the track carriage. The heat, absorbed from the solution, dries the case by the time it is back on the track, and the work of inserting the shaft and fitting the cylinder blocks begins immediately. We have eliminated a rinsing tank by keeping our solution at a certain density and temperature, thus preventing crystallization when cooled.

Fig. 2 shows a gray iron cylinder block being cleaned. The cylinders move from a sub-assembly bench at the side of the tank and are lifted right into the tank, from which they are then conveyed to the track and placed on the crankcase, as mentioned above.

In the lower right-hand corner of Fig. 1 may be seen a truck load of crankshafts, which have just been cleaned. This is an operation which taxes the capacity of the solution, as the anti-rust coating put on these shafts by the manufacturers to prevent rust in shipping is extremely hard to remove. The high lights in the photograph testify as to the effectiveness of the cleaner.

With our former method of using gasoline it took two men 10 hours to clean 40 shafts. We now do the same work in 1 hour, saving 25c. per shaft in labor alone.

Another one of the most difficult cleaning operations we had to contend with was cleaning radiators in our sheet metal and repair departments, prior to soldering.

The accumulation of dust, oil and lime made it impossible to solder them unless cleaned thoroughly. Fig. 3 shows our method. Here we use a stronger solution and

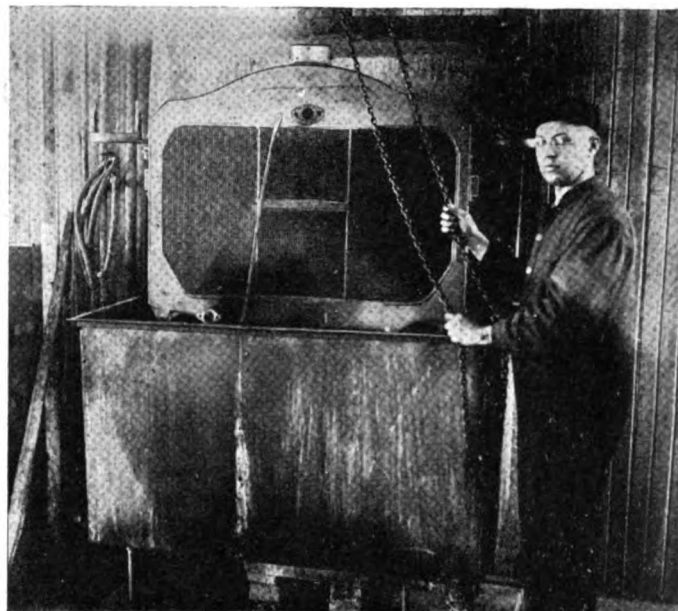


Fig. 3—Cleaning radiators before soldering

allow the radiator to soak for 15 minutes, after which it is rinsed and ready for soldering.

In our grinding department we experienced considerable trouble with sal soda, because the work rusted, and the water, through evaporation, caused the solution to become so concentrated that the sal soda crystallized on the work when dry. The workers, moreover, complained of skin infection, due to working in this strong, filthy caustic solution. We remedied this by using a weaker solution of cleaner, similar to that used in our tanks.

For all screw-machine parts and steel stampings we used a small tank, heated as before, and a perforated container, which allows the solution to drain off the parts.

Regardless of the cleaning method used, the manufacturer of to-day is most vitally interested in comparative costs. While using gasoline for cleaning purposes we averaged fifty gallons a day. At the present market price this amounts to \$15 a day, and with twenty-five working days to the month, \$375 per month. We use approximately two barrels of cleaning compound per month at a cost of \$90, or a difference of \$285 saved per month in materials alone. If to this is added the labor expense saved by the new method the total saving will approximate \$500 a month.

Vibration Periods of Hispano-Suiza 300 Hp. Engine

IN tests made on the 300 hp. Hispano-Suiza aviation engine at McCook Field it was found that there were two very definite vibration periods of 800 and 1200 r.p.m. The vibration may be described as a slight rocking movement accompanied by a violent horizontal movement. There was practically no difference in the vibration of the engine when "motored over" by means of an electric motor and when it was running under its own power. The conclusion was drawn that the cause of these periods is the unbalanced inertia force in the horizontal plane. Staying the cylinder blocks from the crankcase stopped the vibration, and the best remedy for this condition encountered in airplane installations would consist in the use of a much wider engine support base and cylinder blocks securely tied to the support.

What Makes a Labor Policy Successful?

A successful labor policy cannot be developed over night; it is a process of intelligent and well-directed growth. The spirit and common-sense behind it are more important than the mechanical form it takes. Industrial democracy is the form in the plant described; other factors discussed.

By Norman G. Shidle

THOUGH less acute at present than for several years past, the problem of labor and human relationships in industry is still potentially of vast importance. The very fact that labor is plentiful just now should draw added attention to building up an effective labor policy, since the task can be accomplished under more favorable conditions. Such a policy is essential to the manufacturer who is to go forward successfully in the era of more intense competition.

And students of present-day industrial affairs know that the old hammer-and-tongs labor policy will never suffice again. Bismarck is dead; so is Machiavelli; neither blood-and-iron nor an opportunist policy of using any means, good or bad, to attain a desired end can gain success in the conduct of industry's human relationships.

In a broad way the path toward the development of proper industrial relationships has been defined. Mr. Tipper's articles in *AUTOMOTIVE INDUSTRIES* are among those which point the way. It is only through a long period of investigation and actual experiment, however, that practical means of keeping to that path can be worked out. Consequently, the study of industrial relationships in plants which have had more than ordinary success in this line constitutes a valuable part of the work toward the best ultimate developments.

It is with this idea in mind that the achievements of certain firms have been outlined from time to time in *AUTOMOTIVE INDUSTRIES*. The articles are conceived as laboratory examples, useful chiefly for examination and criticism and perhaps as suggesting some policies suitable for wider adaptation. The present article deals with the labor policy of a firm which now has in use an industrial democracy plan, but discusses as well numerous other factors which the writer believes to be equally important in the harmonious condition which prevails.

The successful working out of industrial relationships at the Greenfield Tap & Die Corporation is the result of a long period of growth and the consideration of a number of factors. These may best be discussed one at a time.

The tradition behind the organization has some bearing upon present industrial relationships. Every plant begins to build tradition the day it starts operations. That tradition is certain to have some effect, be it good or bad. In this case, the tradition evolved has been favorable to the growth of friendly relations between employer and employee.

The great-great-grandfather of the present corporation began operations in Greenfield in 1872—49 years ago. This ancestor, the Wiley & Russel organization, employed about 43 workmen. In a direct line from that company, sprang the Wells Brothers & Co., which, beginning about 1876, employed a small number of men for some years. Thus, the beginnings of the corporation centered around small units where the master and man relationship flourished. The tradition began with a mutual understanding and mutual co-operation.

The tap and die industry developed through the years until finally a number of plants manufacturing these articles and other articles closely allied grew up in Greenfield. In most cases the men at the head of these plants had formerly been a workman and began in business for himself by employing a number of men who had formerly worked beside him in the shop.

The corporation began as a consolidation of two companies in 1912, the Wells Brothers Company and the Wiley & Russel Manufacturing Co. The present Greenfield Tap & Die Corporation comprises seven separate units, all of which retain their original names, although organized and administered under one head.

This brief account of the tradition behind the corporation is necessary to a proper understanding of the later developments. One important feature should be noticed. The tradition described comprised among other things a tendency among these older workmen to remain with the same company year in and year out; fathers brought their sons to work in the shop, and every one felt like one of the family. So much for the old days.

Important in the growth as well as in the present development of this corporation is the town in which the plants are located. Greenfield now has 16,000 inhabitants. While it is greatly taxed for housing facilities, the company has done much toward meeting the situation. A hundred houses are now being constructed by a housing corporation, extensively supported by the corporation. The town is located in the midst of Massachusetts' justly famous hills, and natural beauty abounds on every side. The plant itself is pleasantly situated about five minutes walk from the center of town; the view from any shop or office window is pleasant and gratifying.

In short, all the advantages of small town manufacturing are present and aid in making fertile the ground upon which to develop amicable industrial relationships. The pleasant surrounding, the ease of going to and from work, the comparatively lower living expenses, and the natural close associations of a small town all operate to the benefit of the manufacturer, as well as the employee.

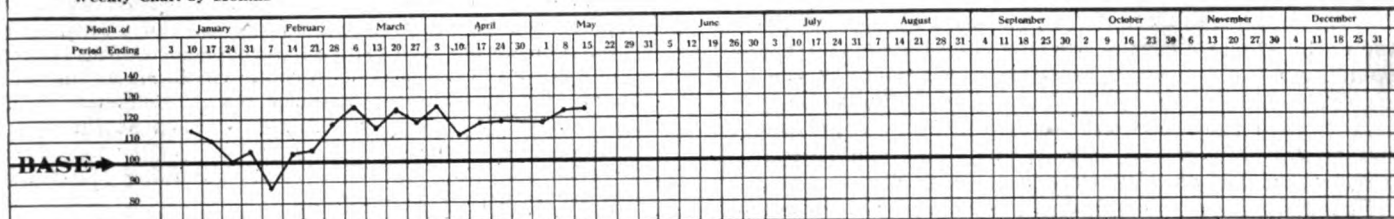
It is easy to belittle the practical effect of such things as tradition and physical surroundings, yet a survey of a great number of typical cases inevitably impresses the fact that their effect is very definite. Such things are not, of course, all powerful; they do not in themselves reduce labor turnover and eliminate industrial trouble, but they are important units in the foundation upon which the structure of proper industrial relationships is to be built.

On this fertile ground, then, the Greenfield Tap & Die Corporation has built an excellent structure. One factor of importance is that of providing steady and continuous employment for the workers. Employed in the seven plants are about 2000 men, most of whom are natives of Greenfield or surrounding towns. Unemployment under such conditions becomes a very serious matter. Every

GTD DIVIDEND BULLETIN Plant No. _____

Weekly Chart by Months

Year 192



Monthly Record

Month of	January	February	March	April	May	June	July	August	September	October	November	December
Basic Percentage	29	29	29	29	29	29	29	29	29			
Months Actual Percentage	27	25	24	24	25	23	24	23	24			
Per cent Dividend to Wages	3.14	5.36	11.15	10.27	7.35	12.21	11.19	12.93	9.98			
Total Amount of Dividend	1,767.73	4,370.52	7,322.42	6,109.67	4,292.91	7,626.53	6,477.78	8,115.17	6,333.11			

NOTE: To insure dividends the production curve (black in chart above) must always appear above the basic (red) line. When it falls below the line, production is falling off and no dividend earned.

1. Chart on which production record is presented to workmen

effort is made to provide continuous employment, and throughout some of the worst of "bad times" this organization and its predecessors have been able to keep their working force practically normal. At the present time it has not reduced its personnel nor have wages been cut. This one fact in itself means a great deal to the intelligent workman.

It may truthfully be said by some manufacturers that they would gladly give their men continuous employment if sales held up and production could be marketed. In such cases, the manufacturer who is unable to do this, though it may be no fault of his own, is simply likely to find himself "up against it" as regards industrial relationships in good times, when the workmen naturally hold to the manufacturer who was able, as well as willing, to help them during bad times. This is a practical and not a moral question—and the facts are practical as well.

Though the organization is now a comparatively large one, care has been taken not to lose the individual touch. This effort is facilitated somewhat by the fact that the work is still done in seven separate plants, each comprising a comparatively small unit. An industrial relations department, established some years ago, facilitates the close touch between management and men. This department was established before the touch was lost; the firm did not wait until it had trouble on its hands. Consequently the ground for its work was to some extent prepared. And it has been possible to keep that touch. The men are still individuals.

A suggestion system is used, for instance, similar to that in vogue at many other plants. Many of the suggestions regard safety, health, sanitation, etc., as is usual. Forty per cent of the suggestions here, however, relate to production methods and a great number of minor changes, each resulting in slightly increased production, have been made as a result of suggestions made by the men. Though each suggestion is small in itself, the aggregate is of considerable value to the management. A detailed story of these suggestions is worth several pages in itself, not merely as an example of the interest shown by the men, but as containing practical suggestions to other manufacturers for improving certain details of their production methods.

A trip through one of the shops impresses upon the visitor that this family spirit and individual interest in craftsmanship has been preserved without any lessening of efficiency; in fact, production has steadily increased. An incident occurred, while visiting the Wells Brothers plant, for instance, which impressed the writer very forcefully, not only for its individual significance, but as an example of what has been accomplished in the direction of preserving individual interest and initiative.

We approached a big Greek workman who was engaged in mottling tap wrench handles. This operation consists in dipping the finished and polished handles into pots of specially prepared chemical heated to an extremely high temperature. The handles are then removed and placed immediately in cold water. The result is to give the handle a beautiful mottled appearance, comprising some three or four different colors.

We watched the work for a moment without making any comment. The workman saw our interest, carefully cooled one of the pieces he had just completed and handed it to the writer for his inspection.

"See," he said, "four colors; I can get four colors. The better polished, then get better color. Must have him just right, though. And no water on him. Any water, boom, he blow up when dip him in the pot."

When the writer admired the work the workman went on to explain how the process was done in detail; to tell what constituted good mottling, and what was bad mottling. He told of possible accidents; narrated how he had once been burned himself, and stated that no one would get hurt at that job if he were simply careful. Through all of his explanations he spoke eagerly and enthusiastically, this Greek with a long mustache that made him appear as though he had certainly been cast to play the villain in a melodrama. But, withal, he reminded one more of a child relating to his fellows some wonderful discovery that he had made. Never, in office or shop, has the writer seen anyone as enthusiastic and interested in his work as was this man.

And he had been working on this job 40 years!

The story is of an exceptional man, it may be objected. To some extent that is true. In another sense it is not. For we talked to other workmen, to other foremen, and

in every case that same interest was displayed to a far greater extent than is common in most organizations. While work is run through these shops systematically and with all the efficiency of a modern industrial organization, there is something different about the way it is done.

When you get to Greenfield, you feel a quiet contentment about the whole place; a friendly spirit seems to radiate even from the table of the little lunch room where you may stop for an early breakfast. And perhaps the spirit of the shop may be best described by saying that as you go through it and talk to men here and there, you still feel as though you were in Greenfield.

The department of industrial relations has been mentioned. It functions in connection with all the plants. A list of its activities shows little that is not common to many other organizations, but its methods differ from the majority. It has operated for several years, and is fortunate in having at its head a man who is capable of being an honest and sincere friend to both workmen and management. This is not an easy task, and it may as well be frankly admitted that the success of an industrial relations department is likely to succeed or fail on the basis of that man's qualifications for the position he fills.

Wages at this plant have been slightly higher than in some other New England towns, and as high as any. They have not been cut. Many of the men work on a piece work basis, and it is the policy of the company never to cut a piece rate unless the operation itself is definitely changed.

On top of these wages, a production bonus system gives the men a definite share in increased production. This system operates by plants, and production figures are posted weekly in all departments to let the men know exactly how they stand. Fig. 1 shows the form on which the figures are posted. The base line 100 indicates normal production. This was determined several years ago by taking the average for several normal months. The men share 50-50 with the management the proceeds from the production made above that normal. The figures posted on the chart indicate the employees' share.

This plan has had a definite effect upon increasing production, and the interest of the men has been greatly stimulated by the chart presentation. Moreover, labor turnover averages only 60 per cent yearly and strikes and labor disturbances are unknown. These results, though briefly stated, are of vast importance.

An industrial democracy plan has been in operation for about a year and is considered by both management and men to be succeeding. Its powers are confined to making recommendations which must be approved by the management in order to become effective. It is significant, however, that thus far no recommendation has been vetoed by the management. On two or three occasions a recommendation has been returned by the management to the workmen for reconsideration. In each of these cases the workmen have seen the justice of the management's argument and have withdrawn the recommendation.

The chief virtue of the plan is that it provides a regular and normal means for intercourse and interchange of ideas between management and men. It is human nature to chafe under restraint. The man who is likely to think himself unjustly treated when he has no chance to air his grievances may never have a grievance when he knows that there is ample provision for him to state it at any time. This normal means of allowing chosen representatives of the workmen to come into regular contact with the management, to present ideas, suggestions, and grievances is an effective method of gaining mutual co-operation and benefits.

The particular system of industrial democracy itself is not very different from that used in a number of other plants. It is described briefly and clearly by Robert P. Dolan, the Industrial Relations Manager of the Greenfield

Tap & Die Corporation, in an article written recently for "Industry." A part of that description follows:

"The organization is made up of a Legislature, Judiciary and Executive Council. Legislature: This body is composed of employees representatives elected by secret ballot from each department on the basis of one to every twenty workers. The primary purpose is to offer suggestions for the betterment of working conditions or improvement of manufacturing methods and to deliberate on all suggestions that may be referred to them at the option of the upper bodies. The Legislature has for its officers a President, Vice-President and Recording Secretary, elected from its membership.

"Judiciary.—This is composed of foremen, assistant foremen and department heads. Their function is to interpret and sift the suggestions of the Legislature, and to further make recommendations submitted for their consideration by the upper bodies. The Judiciary has for its officers a President, Vice-President and Recording Secretary elected from its membership.

"Executive Council.—This includes the Works Manager, Superintendents and general foremen. Their function is to consider suggestions received from the lower bodies and refer them to the Chief Executive or Executive Officers with recommendations. They also consider recommendations referred to them by the Chief Executive or Executive Officers.

"Chief Executive or Executive Officers.—These are the President, Vice-President or Board of Directors of the Corporation. It is their duty to consider and act upon all suggestions and recommendations referred to them by the lower bodies. They may also refer to the lower bodies any matters which they see fit.

"Joint Committees.—From the Legislature and Judiciary are elected four joint committees composed of six members each, three from each body as follows:

"Committee on Industrial Co-operation and Conciliation, whose duties are to bring up matters for discussion at their conferences of their own initiative, or to discuss matters referred to them for their consideration pertaining to the prevention and settlement of industrial disputes, conditions of employment, reported grievances, appeals from discharge, etc., as well as to establish rules and regulations for the maintenance of discipline.

"Committee on Safety and Accidents, whose duties are to bring up for discussions at their meetings, matters of their own initiative or suggestions referred to them pertaining to accidents, the safeguarding of machines, fire protection, first aid, fire drill, etc.

"Committee on Health, Sanitation and Housing, whose duties are to discuss matters of their own initiative or matters referred to them for consideration pertaining to health, physical examinations, medical treatment, sanitary toilets, wash and locker rooms, rest rooms, sanitary conditions in the factory, and in relation to housing problems and its environs, restaurants, etc.

"Committee on Recreation, Education and Insurance, whose duties are to bring up matters for discussion of their own initiative or to discuss matters referred to them for consideration pertaining to social activities, club houses, play grounds, entertainments, athletics, technical education, manual training, sick benefit, insurance, etc., and further to work in close co-operation with the Advisory Board on Social and Industrial Betterment.

"Each of the joint committees has a chairman elected from its membership.

"Personnel Secretary.—Our Industrial Relations Manager acts as Personnel Secretary for the Associates and is a member ex-officio of every committee. It is the duty of the Personnel Secretary to act as the pivot upon which all these activities and committees depend and be a clearing house for all suggestions and business transacted. He sits in at the meetings in an advisory capacity to interpret the Corporation policy.

"Meetings of each of the committees are held regularly on specified dates."

The reader interested in more details concerning the actual machinery of this plan, together with its operation in connection with each of its various functions, will find an excellent treatment of this particular industrial democracy plan in *Machinery* of July, 1920.

It is not by chance that the industrial democracy feature of this corporation's personnel activities has been treated last in this article. It has been described last because it is the last step in a process of development that has been going on, unconsciously perhaps, for many years. The plan is succeeding at the Greenfield Tap & Die Corporation, according to the officials of that concern.

That success has undoubtedly been dependent to a large extent upon numerous other factors. The ground had been properly prepared for such a development. The best of relations existed between management and employees at the time of its installation. An industrial relations department had paved the way by putting over the "square deal" to the men from the management; it had already gone far toward winning their confidence in the integrity of the management, in its justice and its desire to be on the level. Added to this was the everlasting fundamental fact that the management had been on the level.

Thus when the "square deal" statement, which precedes the industrial democracy constitution, was put up to the men, they knew from past experience that they might expect to see that theory worked out in practice; that it was not propaganda given to them under the guise of education or self-government.

The plan was examined and voted upon by the workmen before it was installed. Had they voted to reject it, that would have been the end of the matter.

The success of this industrial democracy plan is indissolubly bound up with many other factors; it is a progressive step made after many other steps in the same direction. The purpose behind its installation was honest, the method of putting it in intelligent, and the methods used in administering it sensible. Consequently it is a success.

Neither this nor any other industrial democracy plan or scheme will solve the industrial problem of a plant unless the other factors are right as well. The form of the plan or scheme itself is comparatively unimportant.

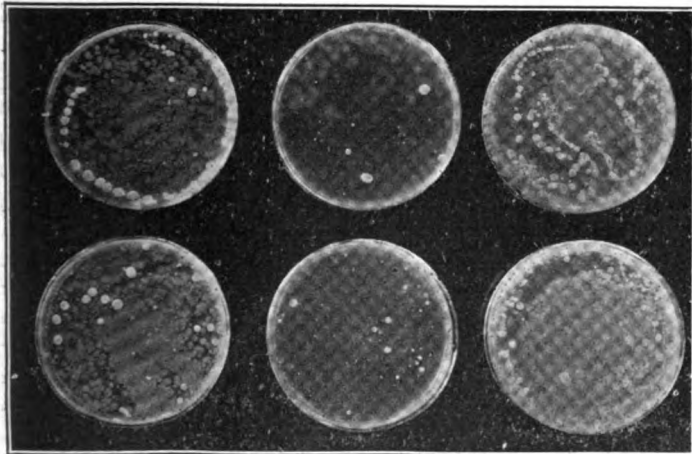
Henry S. Dennison, president of the Dennison Manufacturing Company, has an industrial democracy plan in his organization; the organization is a large one and its president one of the keenest thinkers along industrial lines in this country.

In conversation, he said a short time ago, "All this talk about this or that scheme or plan for industrial democracy as a solution for industrial troubles is foolishness. Industrial democracy in itself is simply the thirty-fourth or thirty-fifth stone in a gradually built up structure; if any one of those other stones were missing the whole structure would topple to the ground. The form of industrial democracy is unimportant; it is the spirit behind it, the steps that have gone before that are essential."

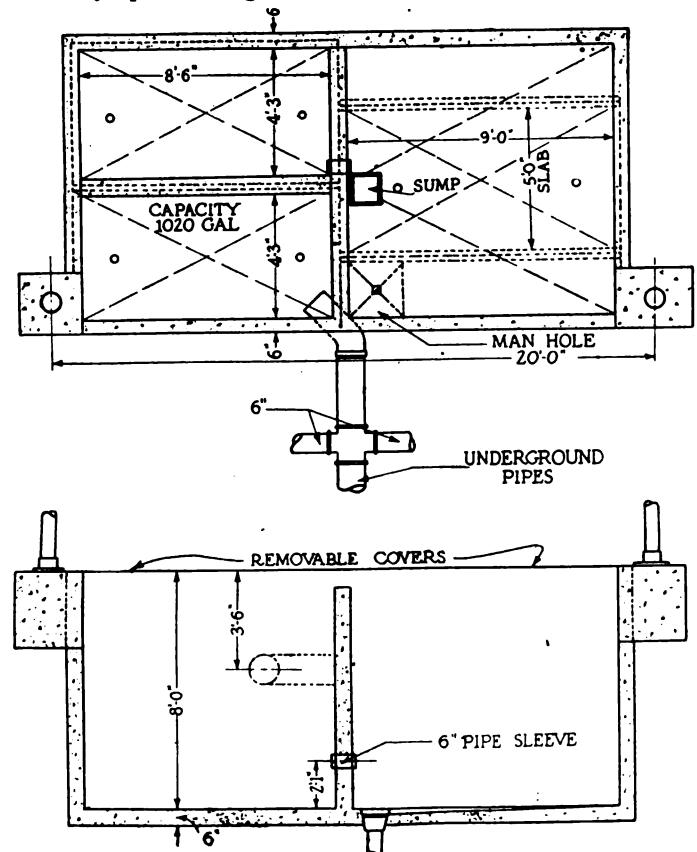
Sterilization of Cutting Solution

AMONG the problems entering into machine manufacture is the proper sterilization of the different solutions used for turning operations, to prevent infection. The Ford Motor Co. has installed large concrete pits with steam pipes running through them, to solve this problem. The cutting solution is pumped into the machines by means of pumps and supply pipes, and returned to the pit for sterilization. The solution is sterilized in the pits, once each week, by heating it to 148 deg. with the steam pipes, and maintaining that temperature for one half to one hour. The installation of the tank equipment is shown in the drawing herewith. The tanks are beneath the floor level, covered by removable slabs. There is a sump at the

bottom of the tank in which the pump operates, so that it is always primed regardless of the level of the fluid.



Micro-photographs showing bacteria in cutting solution. Right hand row shows bacteria in cutting solution of uncleaned machines; center row, sterilized cutting solution in pit; left hand row, sterilized cutting solution contaminated with bacteria from uncleaned machines



1—Sterilizing tanks for cutting solution in camshaft department of Ford Motor Co.

Highway and Cheaper Fuel Promotion Needed in Our Export Fields

Here are some important suggestions from an export manager who has spent two years in foreign fields. Of course, the idea that we should do something besides sell cars there may be startling to some manufacturers, but it is worth a thought. Other notes of interest from foreign fields.

AMERICAN automobile manufacturers should not expect too much from the foreign markets without giving more attention to the development of these markets by way of road propaganda and a more complete study of the foreign field, is the opinion of James E. Burke, export manager of the Stewart-Warner Speedometer Corp., who has just returned from a two-year study of nearly every important country of the world.

Mr. Burke cites as an example New Zealand, with a million population and having at least 25,000 motor vehicles, gasoline at \$1 per gallon and cars costing from 50 to 75 per cent more than they would sell for in the United States. These latter two factors are naturally important ones, and if the domestic market had to face them, it would better appreciate the resistance they offer to sales. Not only roads, but cheaper fuel is essential. When the entire area of the world, outside of Europe, is considered, the road conditions are not comparable with those in America and in the East; there are very few large cities with comfortable motoring conditions outside the main part of the city.

Mr. Burke considers India a great market for practically any kind of a car. The country has 320,000,000 population, a fair system of roads in places, and offers special possibilities.

In Japan, the Government is actively engaged in a road-building program, the country having recognized the necessity of motor apparatus and highways.

China has practically no roads outside of the cities, the waterways having been extensively used. He estimates approximately 4500 cars in a few of the main cities.

Java, with its population of 30,000,000, has been a good car center, practically all of the Dutch planters being buyers. The Chinese merchants have a pretty large hold of the accessory trade on this island. In single-commodity countries, such as China with its silk industry, or Brazil with its coffee industry, the export situation must be more carefully studied, as the problem is more difficult than in a country that relies on a variety of products such as agriculture, manufacture, cattle raising, etc. Mr. Burke believes that the motor car market abroad for American cars is a promising one, but that the conditions of the different countries must be studied.

Generally speaking, the dealers are of a very substantial character and, if given that consideration which export trade deserves, constitute good representation. The truck business is generally slow in all parts of the world, as the business is just getting under way.

A Thought for Mexico

AS the period of readjustment continues throughout the automotive industries, the fact becomes apparent that many manufacturers, in seeking to enroll their

names upon the scroll of foreign trade, have gone after business in the far-away countries and left some of those that are close to home to shift for themselves. The obvious has been too obvious and the will o' the wisp has been chased so far that the chaser, tired out in his quest after the brilliance of distance, has overlooked the lights shining at his very doorstep.

The first case in point is Latin America, and the first country of that great and beckoning domain is Mexico. That country has had little measure of attention from the automotive manufacturers of the United States, although it has been demonstrated as being a potentially large market for those companies which have made a real effort to capture any of its business. A quickening of interest in regard to Mexico has become noticeable during the last few weeks, as the exporters have seen the takings of cars and trucks drop lower and lower in the European countries.

Of course, almost every car made in the United States has been introduced into Mexico City and to some other parts of the country. But that is about all; they have been introduced only. If the exporter, taking time away from his work of chasing the business of Europe, happened to strike a good dealer, his cars found ready sale and good service in the capital city and in other parts of the provinces. But that point was up to the dealer, not the manufacturer. If the dealer happened to be a poor one—and it is surprising the number of such dealers whom enthusiastic travelers have corraled in their jaunts about the foreign countries—the car became immediately a “dead one.” The manufacturer was too busy investigating France or England, for instance, to concern himself with the pushing of cars in Mexico City. It was too close to home and, anyhow, a branch in London or Paris sounded much bigger than one in Mexico City.

This is not destined to be an article giving facts and figures concerning the potential trade with Mexico or even to extoll its merits as an outlet for American automotive equipment. But it is an effort to call the attention of manufacturers to that prosperous and developing country, just as it is to call their attention to the markets that are south of Mexico and which stand out as the natural fields for American commerce.

Export executives have been prone to say that Mexico has been revolution-ridden or that there “isn't any money in the country,” and thus to dismiss the subject with but little thought and most likely no study. The result has been that certain makes of European cars are still among the first four in actual numbers in Mexico City, and that some well-known makes of cars, the worth of which have been proven throughout the world, are scarcely known in that city and not at all in the provinces.

Why? The will o' the wisp shone too brightly farther away and Mexico was forgotten. The market was not de-

veloped, dealers were signed up without thought of the future, and service and repair parts were not furnished. Service and repairs have put several well-known American cars and trucks into the graveyard in Mexico. And, vice versa, service has lifted several American cars and trucks high in the import business as well as esteem of our southern neighbor.

These things would not have been possible, of course, in a buyers' market in which demand was below the supply, as it is now. Mexico and the other countries of Latin-America would have attracted the manufacturer of the United States and less of his sales ammunition would have been expended in the highly competitive and manufacturing countries of Europe.

Buenos Aires Exposition

PLANS are being completed rapidly for the exposition of United States products to be held at Buenos Aires in March, 1921. The importance and desirability of this showing has recently been the subject of special comment by the Chamber of Commerce of the United States in the Argentine Republic which, urging the showing of North American products, declares that the exposition will be the first of its kind in that it will be limited to the manufacturers of one country.

"It is new because it will be the first exposition in history," the Chamber says, "to show exclusively the products of one nation to the public of another nation. North Americans may enjoy whatever credit there may be in originating this idea (which is perhaps the first real novelty in expositions seen in centuries), but they are not likely long to enjoy the monopoly thereof. Competition for foreign trade is altogether too keen to permit the exclusive use by any one nation of a selling influence so simple, powerful and practical. It was inevitable that the idea would be adopted by other exporting nations. Two of them have already, since the announcement of the Buenos Aires exposition plan, issued prospectuses for exactly similar affairs at other strategic points."

The exposition will recommend itself readily to the American manufacturers of automotive equipment and it seems evident that many of them will be found represented in the thirty-six acre exposition ground. The showing of motor cars, as we think of it in the United States, where every city has its annual exhibit, has not taken hold

throughout Latin-America. Dealers are not organized into associations as they are here and the impulse to such showings should come from the manufacturers.

The same conditions apply also as to trucks and to a smaller degree to tractors. Several tractor shows, or contests, have been held recently throughout various parts of Brazil, the Argentine and Chile, and more of these will be held if the manufacturers get behind the idea through their foreign departments. But here the tractor comes under a different situation than does the motor car or truck. With these two, there has been no incentive to expositions, whereas the tractor fits in closely with the agricultural exhibitions that are an established custom throughout many of the Latin-American countries.

A Car in China

THE advent of an American passenger car, the name of which unfortunately was not given, in the interior of China was described by Vice Consul Richard R. Smith, of Nanking, China, in a recent communication to the Bureau of Foreign and Domestic Commerce. This car was driven on tour more than 500 miles and finally was sold at Hankow.

"The automobile was demonstrated chiefly to the local officials and native gentry, who were greatly interested in its operation and price and several sales were made," the Consul writes. "At Kaifengfu, the military governor of Honan not only opened negotiations for the purchase of a car but proposed the building of a road from the north gate of Kaifengfu to the Yellow River, a distance of about 15 miles, where a good cart road follows the river to Tsinanfu, the capital of Shantung. The governor proposes to establish a motor-bus service between the two provincial capitals."

"The representative who demonstrated this car expressed the belief that not only can passenger cars be operated at a profit in China but that motor trucks can successfully compete with native cars in carrying produce from the interior to the railway. Though the territory covered in the demonstration is not equipped with roads in the modern sense and though the surface of the ancient cart roads is very rough, the demonstration was convinced that the road beds were in fair condition and that not much work will be required to adjust these highways to motor car traffic."

Putting a Check on Pseudo Fuel Inventors

THE Empire Motor Fuels Committee of the (British) Imperial Motors Transport Council has been considering the abnormal and unhealthy activity shown by pseudo-inventors in respect of alcohol motor fuels and mixtures containing alcohol. A representative of the committee recently addressed the following question to the president of the Board of Trade: "If the Patent Office will pay special attention to the number of applications for letters patent in respect of admixtures of such bodies as alcohol, ether, kerosene, benzol and toluol as motor fuels, in which applications no element of novelty, discovery, or invention appears to be disclosed, and if he will give instructions to the Patent Office to be especially careful not to hamper or prejudice the production or utilization of new motor fuels by the creation of ground for litigation in respect of alleged master patents?"

In his reply, Sir Robert Horne said that full and proper consideration would be given to all applications for patents

in respect of inventions relating to new motor fuels before the patent was granted and that the Comptroller of the Patent Office in considering what was a proper subject of a patent was, of course, bound by the provisions of the Patents and Designs Act, in accordance with which he must act.

The Empire Motor Fuels Committee believes that great damage may be done to the prospect of early production and marketing of new motor fuels if disregard is shown by the Patent Office to the known miscibility, within various limits, of alcohol, benzol, gasoline and other hydrocarbons and carbohydrates, and the committee warns the public that any claims of master patents should be viewed with skepticism.

A FRANCO-BRITISH syndicate has acquired a large share interest in Galicia, Ltd., a company formed in Slovakia for the exploitation of Galician oil fields.

Survey Reveals Wages Lower Than Estimated by Current Opinion

A wage survey of the automobile industry made by the U. S. Bureau of Labor Statistics during early months of 1919 shows average wage to be 57 cents per hour worked. Only two other paid higher hourly wages and gave employment an average of 8 hours a day. Facts worth attention.

WAGE surveys are at best hard to make and difficult to keep up to date. The rapidly changing industrial conditions of the last few months have made the task more difficult still.

Such a survey, of course, cannot be made in a day, while considerable time is necessary to record, tabulate, and publish results. Nevertheless, the recently published wage figures for the automobile industry presented by the Bureau of Labor Statistics are of special interest from several angles.

This survey was made between Jan. 11, 1919, and April 26, 1919. It included 32 typical establishments—13 manufacturing passenger cars, 14 manufacturing commercial cars, and 5 manufacturing both types of vehicle. The plants investigated were located in seven different States and employed a total of 17,812 male workers and 622 female workers.

The hourly wage given in the figures is based upon the average earnings per hour worked. The automobile workers averaged 8.2 hours per day during the period covered by the survey, so that the hourly earnings given constitute a fair statement of the man's real earnings, assuming eight hours to constitute a normal working day.

Similar surveys were made for twenty-nine other industries, so that interesting comparisons can be made. The introduction to the printed report of these surveys defines the limits in this way: "All salaried official and clerical employees were omitted. Of the remaining employees, all were included except—

- (a) those whose pay was due wholly or in part to their performing a supervisory function;
- (b) those who, either because of their youth or inexperience or partial incapacity, were receiving a wage distinctly below the normal;
- (c) those who were performing functions so varied or poorly defined that they could not be classified;
- (d) those in occupations with so few employees that even a considerable number of establishments would not provide enough to make a fair showing.

"The figures given in the tables may be relied upon as giving hours actually worked and earnings actually received. . . .

"So large a number of employees is included in these summary tables that the figures given may safely be regarded as fairly typical of the country at the time the survey was made."

With these explanations in mind, the actual figures presented reveal certain facts somewhat different from those which have been assumed and eagerly quoted during the last four years by casual observers and enthusiastic journalists.

The average wage in the automobile industry during the period of the survey was 57.1 cents an hour on the basis of average earnings per hour worked. On this basis,

the automobile industry stands eighth in the list of industries. Five of those industries which record a higher average wage per hour, however, gave employment to the workmen less than 8 hours a day. Of those industries in which an average of 8 hours or more was worked daily, the automobile industry stands third. The two above it are:

1. Woman's Clothing	\$0.724	8.1 hours
2. Machine Shops (other than machine tools) .....	.599	8.2 hours

The casual visitor to automobile plants during the last few years was likely to get the impression that the average wage for everyone above the class of laborer was between 80 cents and \$1 an hour. A detailed study of the survey does not bear out that impression.

Of the entire number of workmen included in the survey of the automobile industry 7.3 per cent received 80 cents an hour or more.

17.3 per cent received more than 70 cents and less than 80 cents an hour.

33.4 per cent received less than 50 cents an hour.

So much for the general averages in which all trades and classes of labor are bulked together. Of the 38 trades listed for male workers in the automobile industry, the following received in actual earnings more than 70 cents an hour:

1. Back Hangers and Trimmers (Trim Shop)	74.3 cents
2. Rough Stuff and Varnish Rubbers (Paint Shop)	72.0 cents
3. Strippers and Letterers (Paint Shop)...	71.6 cents
4. Toolmakers and Diemakers	75.4 cents
5. Top Builders (Trim Shop)	73.4 cents

The highest paid of this group are the toolmakers, workers in a highly skilled trade, as might be expected. The other workers in this group are more or less skilled; they have in common, however, one characteristic. That is the trim shop and paint shop men are probably more highly and actively organized in the automobile industry than any other trade group.

The lowest paid groups were, as would be expected, the laborers with 46 cents an hour, and the blacksmith's helpers with a similar rate. Next came the packers and furnace helpers, who drew 48 cents an hour.

It should be noted that in computing all these rates, actual earnings have been the basis of computation; that is, bonuses, premiums, etc., are all included.

The foregoing figures apply exclusively to male workers. Where comparisons can be made, the statistics show women workers to receive much less wages per hour than do the men. This would indicate different things, depending upon whether the work was piece work or day work in a particular plant. In the former case, it would mean

that the women could not produce as rapidly as the men, assuming that the piece-rates were the same for each sex. In the second case, it would indicate that women were paid less wages than men for similar work.

The detailed figures of the thirty surveys are to be found in Bulletin No. 265 of the Bureau of Labor Statistics. A number of industries closely allied to the automobile industry were included in the survey. Among these are:

Coal	Lumber
Foundries	Machinery
Glass	Machine Tools
Iron and Steel	Rubber
Leather	

While it is true that the figures presented in this survey are somewhat out of date at present, they are of interest as being the most complete data available. The fallacy of one common tendency is revealed, however; that is the tendency among some persons to generalize as a result of a specific incident or experience.

For example, many people during the last few years have repeatedly bemoaned the high wages which workmen were getting, dilated upon the silk shirts and automobiles the mechanics have obtained, and said that "common laborers are getting over a dollar an hour"—and on that last statement they have based all their industrial opinions.

Many times within the last two years, manufacturers when asked, "What does the average machine operator in your plant make?" have answered:

"Oh, 80 cents to \$1 an hour. Why one man here last week made over \$200." And the questioner has gone away with an entirely false impression of the average wages of the average workman. It does not do to hear that one workman made \$18 one day and then consider denunciation of high wages justified on the basis of that man's earnings. It does not do because when accurate facts and statistics finally appear, the reaction cannot be anything but unfavorable.

Within the last eight months casual inquiries have been made in a large number of automotive plants as to what the average workman was earning. Taking fully into consideration the wage advances of the early part of 1920 over those of the period of this survey, no conclusion can be reached but that the figures presented in this government survey are incorrect or that the answers to the queries cited were not accurate.

If the figures are not correct, automobile manufacturers would do well to submit proof to the contrary, for it is from these government statistics that labor unionists, journalists, and others who mold public and labor opinion will take their facts.

New Problems Regarding New Americans

ASSIMILATING the foreigners who come to our country has always been a pressing problem; a problem which has never been adequately met. But new problems have arisen lately which make even more complex the task before America. The vital importance of the proper accomplishment of this task to the manufacturer is pointed out in a short article by Francis A. Kellor, of the Inter-Racial Council, who has just returned from an industrial survey of conditions in Europe. A portion of Mr. Kellor's statement is as follows:

"The time has passed when the American employer could count upon an unlimited supply of labor from abroad. Emigration from the countries of Europe will be strictly regulated by the governments in the near future, and is already being directed in some of the Old World nations, which have begun to realize the value of their workers. Instead of permitting their men and women to leave at will and select their own destinations, as in our part, emigration will be curtailed by many governments to the extent deemed expedient for their own interests. Instead of the emigrant selecting his own future home, the governments will advise him where to go, and in some cases will retain him as a citizen, with voting rights, even while living abroad. At present the Lithuanians in America have three deputies to represent them at the next meeting of the Constituent Assembly of Lithuania, while Italy has under consideration a plan to give its nationals throughout the world elective representation in its home government.

"This means that the immigrants who do come here will have less tendency to make America their permanent home and become citizens, hence we will have to make greater efforts to assimilate them than we have done in the past.

"Some of the foreign nations are planning to do the things which America should have done long ago; to protect immigrants from fraud, to establish official information bureaus, to take care of their savings through branch banks and generally to look after their welfare.

"The most powerful inducement to foreigners to remain in this country is, of course, just and humane treatment, with no discrimination in wages, housing, living and working conditions between them and the native born.

Efforts should be made to establish closer relations with the foreign born workers. If they have legitimate causes for discontent, the grievances should be understood and removed. The same spirit of co-operation that is being secured through enlightened employers and their English-speaking workers should be developed in relation to the foreign born laborers.

"This is not 'coddling,' not philanthropy, but labor conservation. As in the early days of America, we were wasteful of our resources, coal and oil, natural gas and timber, until we saw the results of extravagance, so at present we are as wasteful of our man-power, as if the supply were inexhaustible.

"The course of action for the employer is, therefore, first, to conserve labor as carefully as he conserves his raw material; second, to regard immigration problems with the same interest that he gives to international commerce, realizing that America is no longer isolated and that what happens in the Old World to-day will be reflected in his own business to-morrow."

AMODIFIED form of official indicator for studying pressure phenomena in high speed internal combustion engines has been constructed by Prof. F. W. Bustall of Birmingham University. A very intense, thin beam of light is projected on to a plane mirror; the mirror itself is fastened to the end of a steel spring, and the motion of this spring is proportional to the pressure in the engine cylinder. The ray of light reflected from the mirror is caused to impinge on a second mirror which is driven from the crankshaft so that the ray of light has a double motion. The results are recorded on a photographic plate, and in this manner it is possible to take the photograph of the complete cycle of operations in less than one-hundredth part of a second. To secure accuracy, a great many points have to be attended to, as the movement of the springs is so small that a very small error or lost motion completely destroys the accuracy of the results. These sources of error are said to have been overcome to such an extent that the errors at no point of the diagram exceed $\frac{1}{2}$ per cent.

Motorcycle Industry Well Started on the Up-grade

Both commercially and socially the motorcycle industry may be said to be on the up-grade. Intensive sales effort and definite attempts to give the motorcycle a more favorable standing in the community were the points emphasized at the dealer convention of a large manufacturer.

By Norman G. Shidle

WHILE the motorcycle industry has been affected by the present business slump along with others, it has not been slowed down to any appreciable extent. Dealers are planning intensive sales promotion efforts for the winter, and are firm in believing that they will cash in on these efforts in a big way as the spring of 1921 comes around.

Definite efforts are under way to raise the motorcycle in the estimation of the general public; to bring merchandising methods to a higher plane; to establish in the minds of every class of people the thrill and joy of the motorcycle as a sport and its usefulness as a utility.

These were the chief ideas stressed at the dealer convention of the Harley-Davidson Motor Co. held in Milwaukee Nov. 4, 5 and 6. The tendencies of the motorcycle industry as expressed at this convention assume a larger importance than would a similar convention in the automobile field. This is true because there are in this country only a few motorcycle manufacturers, and only three of any considerable size. Consequently the tendencies indicated by a dealer convention of one of these three assume considerable importance in an analysis of the present status and future possibilities of the motorcycle in this country.

Many popular objections and criticisms of the motorcycle are current in every community. With these criticisms the industry has had to contend, but there was one striking fact about this convention.

Every one of the current objections to the motorcycle was thoroughly discussed. The dirty driver, the noisy cut-out, the accident features, the unfavorable publicity obtained as a result of accidents, motorcycling as a "rough-neck" sport—all of the unfavorable criticisms are thoroughly recognized by the men behind the motorcycle industry, and intelligent effort is being expended in trying to eliminate the objectionable features, combat such criticism as is unjust, and bring the motorcycle into good repute among those people who, up to the present, have regarded it with aversion. Not only are these problems being studied, but practical means for correcting them are being worked out.

The motorcycle industry is not going backward; it is very definitely on the up-grade. And as far as the present slump is concerned, it is interesting to note that every indication points to the fact that it has not been nearly as hard hit as its big brother, the automobile industry.

For instance, with a few notable exceptions the automobile plants of this country have all made reductions in their working forces during the last few months, while some plants have temporarily closed down.

The Harley-Davidson plant has cut its working hours from 10 to 8 hours a day, but has not reduced its working force. The production has been decreased in proportion. As regards plans for 1921, production for that year had been planned for 30,000 motorcycles. That schedule has been reduced to 24,000 in light of present conditions, but Walter Davidson, president of the company, is authority for the statement that there is a good chance that that schedule will later be revised upward.

Throughout the convention optimism characterized every speech. But the necessity for more than "talking optimism" is recognized. In his address, opening the business session of the gathering, Davidson told the dealers that while there was every reason for optimism a great deal of sales work would be necessary. He advised the employment of intensive sales and advertising efforts, and said that the overhead costs for sales and advertising would increase during the coming year.

There was no hint that sales promotion efforts should be curtailed in order to save money. On the contrary, great emphasis was laid upon the necessity for advertising, direct mail campaigns and intensive sales efforts as the only sure means of keeping sales up to normal. The idea that "every difficulty is a challenge" predominated.

The motorcycle is being marketed in two ways:

1. As a sport.
2. As a utility.

The sporting angle plays by far the most important part, and it is from this point of view that the most extensive efforts are being made. One man, long in the motorcycle business, stated that 80 per cent of motorcycle sales were for sporting or recreation purposes, and that he believed the greatest possibilities for future development lay along those lines.

With this idea in mind, many dealers are making an effort to place motorcycling favorably before the public as a clean, manly and interesting sport. Some of the principal methods of accomplishing this purpose are as follows:

1. Keep demonstrating machines "spick and span."
2. Keep salesmen cleanly and attractively attired when demonstrating.
3. Try to "sell" to drivers the idea of cleanliness and neatness in attire and of refraining from unnecessary noise in driving.
4. Organize week-end trips, "gypsy" tours, small clubs, etc. Through this work, organized and participated in by the dealer, the best ideals of motorcycling can be instilled into the riders in any particular territory.

5. Keep salesrooms and repair shops clean and in good order; keep windows clean and attractively decorated.
6. Render courteous service to customers.
7. Attempt in every way, through publicity and actual riding, to place the motorcycle on a higher plane than it has heretofore occupied in the minds of the public.

A noticeable feature of this convention was the general sentiment that one of the big tasks before everyone in the industry was:

1. To so conduct himself as a rider that he might be a good example to those outside the industry.
2. To help bring the motorcycle in general to more favorable attention without regard to the merits of any particular machine.

There might seem to be one objection to the emphasizing of the sport side of the motorcycle and the subordination of the utility angle. That is, in times of credit stringency or other emergency when a line is likely to be drawn between essentials and non-essentials, the motorcycle might feel the ill-effects more rapidly and meet with more difficulty than if it had been presented more emphatically as a utility product.

When this possible objection was brought to the attention of Davidson, he stated that when money was tight the sportsman was likely to be the only man who really had any money, and that he would still spend it to obtain his sport. He believes that something like that situation obtains to-day, when the drop in motorcycle buying is not so great as in some other lines of business. While many motorcycles are sold on time payments, Davidson said that the manufacturer had always urged the dealer to be very strict in such cases to obtain a large payment down; that under present conditions, for instance, practically one-half the entire selling price was being exacted as an initial payment, and that the men who went in for sport were those who had more ready money than any other class.

The fact that emphasis is being laid upon the sport side of the motorcycle, however, does not mean that its utility value is to be neglected. Many sales are possible for utility purposes, and some dealers have been particularly successful in developing this phase of sales effort.

In defining the possible field for the motorcycle, E. J. Mueller, sales manager of the Harley-Davidson organization, stated that analysis showed that one man in every 5000 was a motorcycle prospect.

The value and necessity of advertising constantly and in a proper manner were emphasized throughout the convention. As one man tersely said, "Doing business without advertising is like winking at a girl in the dark; you know what you are doing, but she doesn't."

In discussing the effectiveness of various means of advertising, the newspaper was, of course, accorded a prominent place. The direct mail campaign, however, came in for extensive discussion and will probably play a larger and more important part in future motorcycle sales efforts. Some attempt has been made at street car advertising, but had not met with a very enthusiastic reception from the dealers.

In connection with advertising, the matter of racing was discussed. While such publicity was claimed to have an enormous value, its cost was shown to be very heavy.

It seems possible that more attention has been given to the racing features of motorcycling than the best sound and permanent development of the industry might warrant. Racing is an expensive form of advertising

and is very effective with a certain class of buyers—chiefly those who have already been buyers rather than those classes to whom the motorcycle has not yet appealed. The young man or boy may be strongly influenced to buy a machine because the manufacturer of that machine won a national championship recently. But the higher type of buyer knows that the machine he is buying is nothing like the machine which won that race, and that there is little logical connection between them, except that both were made by the same manufacturer.

It would seem that there is in this country a great potential group of motorcycle buyers who would enjoy the pleasure and outdoor features of the sport minus the actual thrills. Certainly the racing angle of motorcycle publicity is developed far more extensively than some other angles that are, perhaps, of equal importance.

The dealers themselves, for instance, are usually riders as well and are sometimes so desirous of reading the racing news and gossip of their trade papers that they find little time to peruse the articles which concern adequate accounting methods, effective salesmanship and service, and other practical business helps which would better aid them to sell machines than the races. This is the opinion of several men long connected with the motorcycle industry who are not directly concerned in the manufacture or sales of the product.

The status of the motorcycle industry so far as financial interests are concerned seems favorable, according to the statements of two prominent Western bankers who addressed the convention. J. H. Puelicher, president of the Marshall & Ilsley Bank of Milwaukee, stated that the motorcycle industry was performing a real service to mankind and for that reason would survive and grow.

In regard to the general financial situation, Puelicher said that "every manufacturer wants everyone else's price to come down, but wants his to remain where it is." He said also that those who took advantage of the war situation are those who are crying the loudest against price reduction. He sees in the present situation a healthy return to normal—a normal deflation which has no horrors for the man who has an honest product to sell at an honest price.

In a consideration of the possibilities for the future development of the motorcycle in this country, the popularity of that vehicle in England is certain to enter the discussion. In England there are almost as many motorcycles as there are automobiles; that is, England has many more motorcycles in proportion to its population than has the United States. The questions arise, can the motorcycle in this country ever attain to a proportionate development and use? Why does England have so many more motorcycles per person than does this country?

This phase of the motorcycle question was put before several men prominent in the industry, among them Walter Davidson and W. H. Parsons, editor of *Motorcycle and Bicycle Illustrated*. The reasons for the greater proportion of motorcycles in England was attributed to these causes:

1. England is more of a "sporting nation" than is the United States. Englishmen devote more time to sport and less to business. There is this definite psychological reason.
2. It costs more to own and operate a motorcycle in England; consequently it has appealed to a higher class of people. Men who might own a Dodge or Ford in this country pay the same price and gain the same prestige in England by riding a motorcycle. These men might own small cars in this country, but in England cannot afford one.
3. England has better roads.

It is interesting to note, however, that anyone of the three large motorcycle manufacturers in this country manufacture more motorcycles per year than do all the manufacturers in the rest of the world outside of the United States. This is true despite the fact that there are about 150 manufacturers in England alone.

The American motorcycle, moreover, is acknowledged by engineering experts to be far ahead of foreign models as to design, construction, workmanship and service.

The last registration figures compiled by AUTOMOTIVE INDUSTRIES showed that there has been a considerable dropping off in motorcycle registration during the last year. This has led to the conclusion in some quarters that the motorcycle industry was on the wane. This is not the case, however. The drop in total registration is readily explained.

There were formerly some fourteen motorcycle manufacturers in the United States. Now there are six. Many persons were still riding these old machines, of course, long after the manufacturers had gone out of business. Gradually these machines wore out and went into the discard.

On the other hand, those manufacturers still in business have been utterly unable to meet the demands for their product during the last few years, consequently they have not yet been able to re-sell the former users

of these old machines, since there have not been produced nearly enough machines to meet the new demands. As a result, all those manufacturers still in business have greatly increased their production and sales each year, even though registration figures have fallen off to some extent.

And it is just because of this situation, according to Davidson, that the prospects for the motorcycle industry are exceptionally bright even at the present time of business depression. There is a potential demand for motorcycles that has not yet been filled; the market is not anywhere near even temporary saturation.

It may safely be said that the motorcycle industry is rapidly assuming a higher tone than it has ever before had. The dealers of the industry are definitely changing caste; the clean-cut, progressive business type is rapidly replacing the old-timer, who was long on mechanical ability and grease but short on courtesy and progressive methods.

This change is becoming more rapid each month, and as the change is completed new spheres of influence and new fields for sales obviously open themselves to this industry, for which every indication points to a gradually growing success and a steadily rising standard of performance and activity.

Non-Inflammable Baking Japan

BAKING japan, as ordinarily used in manufacturing, consists of two elements, the base and the solvent. The base is usually some variety of asphalt, combined with linseed, or some similar oil, the whole making a hard rubbery appearing substance. This must be liquefied for use, and the common practice is to dissolve it in naphtha, or kerosene. The process of japanning various metal articles consists in dipping them in the liquid japan and then baking them in an oven.

Owing to the volatile and inflammable type of the solvents used, this baking process is somewhat hazardous. After several bakings have been consummated the atmosphere in the oven resembles that of the inside of a gasoline engine cylinder, only needing a spark, or even excessively high temperature to cause an explosion of great force. Occasionally the results of these ovens blowing up have been disastrous, due to losses from fires caused by the explosion.

This risk has been great enough to cause some of our large municipalities to consider requiring a manufacturer to not only isolate his oven buildings, but to provide further protection in the form of a fire wall. It also seemed possible that the insurance companies might become interested to the extent of causing increased expenditures on the part of manufacturers who are large users of japan.

The manufacturers consequently became interested in the possibility of developing a type of japan which has a non-combustible solvent. The Research Laboratory of the General Electric Co. was requested to try and evolve such a product and a course of research on their part resulted in the development, by them, of a variety of japan which eliminated the necessity of a solvent possessed of the destructive propensities of the conventional kinds.

WATER JAPAN—AN EMULSION

This water japan, as it is called, is an emulsion of the asphalt oil base with water. By this is meant that infinitesimal particles of the base are held in suspension in the water, instead of being dissolved in it. It was

found that this japan had no tendency to settle out, even after months of storage, and that, owing to its being "suspended" in water, losses by evaporation were practically negligible.

The methods of applying the japan are two in number, the electric dip, and the hot dip. The former is appropriate for small articles and consists in placing them, charged positively, in a negatively charged iron tank of japan. The result is that an even, smooth coating of japan is deposited on the articles in question, and, since the japan is deposited free from solvent, there is no resultant drip when the lot is conveyed to the baking ovens.

The second method, or the hot dip, which is applicable to large pieces of metal, was found more or less by chance. It had been the custom in the laboratory to pre-heat the metal before dipping, in order to free it from dirt and grease. This pre-heating evidently had the same effect of causing the japan to form a deposit on the metal as giving it a positive electrical charge. A third method is also sometimes used, which is a combination of the two already mentioned. That is to say, the metal is both heated and positively charged.

The result has been that a variety of japan has been evolved that gives exactly the same effects as the solvent variety. It is cleaner to handle, owing to the absence of drip, and eliminates the danger from explosions and disastrous fires that were such an unpleasant feature of the old form of this highly necessary compound.

THROUGHOUT England there has been a remarkable growth in the number of technical students. The increase in the number of students at Birmingham University in electrical and mechanical engineering, in coal mining and petroleum, and in metallurgy, chemistry, and physics, has been phenomenal; and for physics and chemistry, ten Army huts, 70 x 30 ft., have been erected as temporary laboratories. The Senate has launched an appeal to the Government and the Midland manufacturers for half a million pounds.



Crankshafts for Eight-Cylinder-in-Line Engines

Editor AUTOMOTIVE INDUSTRIES:

I have read with interest your editorial in a recent issue under the heading "Eight-Cylinder-in-Line Engines." I agree with you that this type of engine for certain classes of cars may get "en vogue." My reason for writing you, however, is that in discussing the various possible and desirable types of crankshafts you have in my opinion omitted the best type. This crank is built up from two standard four-cylinder shafts in such a way that one of these is used for the four center cylinders. The other four-cylinder shaft is parted in the center and one-half of it is placed in front of the other four-cylinder shaft, twisted 90 deg. center to center from it, the other half being placed in the same plane symmetrically at the rear end. This type of shaft, of course, gives complete balance of all inertia forces, there being neither a free vertical force nor a rocking couple. This shaft is as easy to drop-forged as a six-cylinder shaft, and the two 90 deg. twists necessary should involve no difficulty. Eight different firing orders are possible with this shaft between the limits 1-4-2-3-8-5-7-6 and 1-5-2-6-8-4-7-3, according to the designer's wish to distribute the impulses. The eight-cylinder-in-line engine has several advantages over the other possible engine arrangements, presenting as good or better torque as the eight and twelve cylinder V types. It is much more get-at-able, it is cheaper to make and it is narrower and therefore easier to accommodate under the present style narrow hood. As examples of modern European engines may be mentioned the Isotta and the Leyland.

Uppsala, Sweden.

JAN G. SMITH, M. E.

Lack of a Specially Designed Motor Bus Chassis

Editor AUTOMOTIVE INDUSTRIES:

MOTOR buses are making wonderful strides all over the country, and there is a large field open for the enterprising man who will run them on business lines. This is especially true in this vicinity (Watertown, N. Y.), where a number of successful lines radiate from the city.

Most of the buses are home-made affairs, crude and clumsy to ride in. Some are cutover touring cars, some are trucks meant to carry freight, and all are far from satisfactory. There does not seem to be any effort by car makers to touch this field. A bus is a cross between a truck and a touring car. It wants some of the speed of a touring car and the full electrical equipment, but it also needs the sturdiness and chassis lines of a truck.

The average seating capacity of a bus for suburban work is 20 passengers, with an average run of 25 miles for successful operation. This is the experience of those engaged in the business in cities with a population around 50,000. Buses were operated profitably at 2 cents a mile per passenger in this vicinity for some time before the high prices set in, but 3 cents a mile is now required to make the business profitable, unless you can be assured of

a large volume of business at all times, when the lower rate will be good. Most motor bus men make the mistake of charging high fares and never get a steady trade. The people who travel in buses are not those who can afford automobiles, and unless the fare is within their reach, they will not travel often. The result is, the bus is being operated with a number of vacant seats that bring no income.

If car makers will build a chassis along the following lines and specifications, a number can be sold in this vicinity: Wheelbase, 160 or 170 in. Tires, 36x6 in. all around. (This size tire is not needed in front, but with the same size tires all around a driver needs only one spare; besides, a half worn out rear can be put in front.) A 1½ ton truck frame and spring suspension. Worm drive with 5½ or 6 to 1 gear ratio. Dry disk clutch. Full floating rear axle. Engine, 6 cylinder developing 40-50 hp. Must have very liberal bearings for long wear and a simple but efficient oiling system. Self starting and charging system in separate units that can be readily replaced. A strong radiator that doesn't look like an iron fence. All material to be the best possible.

A good substantial body weighs about 1200 lb. Twenty people, averaging 150 lb., weigh 3000 lb., making a total load of 4200 lb., or 5000 lb. to make a liberal allowance of passengers and body.

The writer has made a diligent search for such a type of chassis but has been unable to find anything that just suits. The nearest thing that has been found is the ambulance chassis which a few makers manufactured but have now discontinued. This proposition for the manufacturer is to build chassis only. Bodies can be built in almost any city to suit requirements and designs, although one standard type and design bus would help sales where the customer wants a ready-made outfit.

Watertown, N. Y.

A. F. WARNER.

Reaming Crankshaft and Camshaft Bearings

REFERRING to a recent article in these columns in which mention of their reamers was made, the Kelly Reamer Co. informs us that in order to use these tools for reaming the crankshaft and camshaft bearings of engines, it is not necessary that the bearings be stepped. Perhaps 90 per cent of their customers among motor manufacturers use the Kelly reamers on crankcases with all bearings of one kind of the same diameter. It is advantageous, however, to step the crankshaft and camshaft bearings in opposite directions, as by doing so the necessity for changing cutters is eliminated, whereby production can be increased about 80 per cent.

As a somewhat different impression was conveyed by the article referred to, we are glad to set the matter right.

THE American Society of Agricultural Engineers announces that the transactions of the Society for the past year have been compiled in book form and are now on sale to non-members at \$1 a copy. The volume includes the chief papers read during the year. The secretary of the Society can be addressed at Ames, Iowa.

The Neglected Element in Labor Relations—The Foreman

In modern industrial organizations the contact between the worker and the employer must, of necessity, be that existing between the shop or office supervisor, best known as the foreman. If he is not informed as to company policy, can he be blamed for misinformation handed on to the workers?

By Harry Tipper

THE necessity for considering the general attitude of labor and experiments which have been made in connection with the readjustment of industrial organization in developing closer relations between employer and employee, has made it difficult to differentiate between employees and to give the attention to the supervisory employees which they require.

Of all the supervisors in the line of management, those who are in direct charge of small groups of workers are of the utmost importance, whether they be subforemen or foremen in the shop, chief clerks, inspectors in charge of a drafting room or supervising sections of an accounting department. These employees are the ones who are intimately in touch with the workers in the ranks and who by the very character of their contact are more influential not only in the quality of the work which is performed, but in the approach of the worker to his work and the attitude of mind with respect to it.

For the most part, these men are not only more intimate with the workers while they are at work, but they are sufficiently near the same type of social existence, the same amusements, the same reading and the same general understanding to be thoroughly sympathetic with those over whom they have supervisory charge.

This is not affected by the fact that some of them are drivers instead of leaders, and that many of them are inclined to feel the honor of their responsibility in their attitude toward their subordinates. These are the men who must face a thousand and one trifling and intimate problems, which affect the final result in the production or the other elements which enter into the complete business of manufacturing. They cannot settle any of the broad plans, change any of the systems, rearrange any of the methods, but they must solve all the little difficulties which enter into the operations of these systems and methods and the development of the plan.

For some reason in the general tendency to develop better relations with the workers, these supervisory employees—through whose hands filter all the instructions of the management, all the final operations of the systems and methods—have been neglected to some extent and their power as a force for better relations has not been used or studied to any very great degree.

In very few factories are the foremen thoroughly conversant with the reasons for the various systems by which they must work, the methods of arranging the work and the other general plans to which they must harness their group. As to the knowledge of the expense

of a business, the proportionate costs and profits, they are almost as ignorant as the subordinates by whom they are consulted on these matters and to whom they must offer their instructions and their advice.

The purpose of management, the effects of idleness of machines and men, the cause of spoiled work, the reason for inspection, orders of work and innumerable forms, the value of other departments of the business are rarely understood and little effort has been made to see that they can explain such matters properly and aid in the development of the right kind of information among the workers.

The responsibilities which they have result in a loyalty to their work and organization that has made them more permanent and more faithful in the discharge of their duties. Perhaps this is one of the reasons for the neglect of their possibilities by the average manufacturer.

There are almost a million of these supervisory employees directing the energies of small groups of workers of all kinds in the United States to-day, whose influence with these groups is very definite and very considerable. If these men all understood more definitely what industrial organization means and the value and necessity of the various departments of the business, they would form an educational force capable of affecting the attitude of the worker to a degree altogether impossible otherwise.

They are acquainted with John and Bill in an intimate way which is impossible for the general manager to develop, no matter how he may desire to do so. Even the representatives of the workers on the works committee will not carry all the influence that these supervisors can wield. They have a lot of problems to meet, and even the problems can be handled more effectively if they have an opportunity to discuss them, or if they are given a full understanding of the systems with which they work.

In some factories, schools have been started for the training of foremen along these lines, and in one or two of the larger manufacturing establishments, meetings of foremen are held frequently to discuss the problems which they are to overcome.

These methods have been of value wherever they have been tried out, but they have not gone sufficiently far in considered the other supervisory employees such as head clerks, and the supervisors in departments of the factory not immediately in the shop and the production work. Furthermore, they have not taken up, sufficiently, the elements of organization and the reason why organization has developed along given lines.

It will be interesting to any manufacturer who has not tried it, to find out what these employees know about the relation of their own department to the other departments of the company. The elements which enter into the cost of their departments and the value of the different branches of organization which are considered necessary by the company to effectuate their total business.

It must be remembered that these men have been chosen from the ranks as a rule for their superior skill in their work, and for the human qualities which indicate that they would be able to handle a small group of other men.

Neither their work nor their outside education has given them a decent understanding of the relation between different branches of the organization nor the reason for a good many of the methods. They cannot be expected to acquire this information outside of the industrial establishment, and up to the present their opportunities for acquiring it inside have been very limited.

Such a supervisor, filled with the misinformation which can be acquired very readily from his ordinary sources or without the proper information, can do much to nullify any work which is attempted by the general management in the bettering of industrial relations—unless that work has had for one of its first objects the education of the foremen along the same lines.

In many lines of endeavor, the workman believes that it is more important for him to work under a square foreman than it is for him to know anything about the policies of the company.

He is more anxious to know about the foreman than he is about anything else but wages. The same thing is true of the clerk who must work under his supervisor and of all employees of the ranks. The policies of the company, the ideals of the company and the justice of their actions, are no greater than the understanding of the supervisor, the character of his ideals and the visible value of his actions from a human standpoint. Leadership in the high places is of little value, unless the un-

derstanding extends through to the smallest leader of the establishment.

In one establishment with which the writer was acquainted there was continual trouble with one section of the accounting department. The turnover of employees was much greater than it ought to be and the co-operation much less. It was not until the matter became sufficiently notorious that an investigation showed the chief clerk of that department to be at fault because of his attitude to his subordinates.

A change of foremen in one shop so affected the work which had been accomplished by the shop committee in the previous year that it was nearly two years before the effect of that difficulty could be removed. In neither of these cases were the supervisors entirely defective in their capacity. In both cases they knew the work very thoroughly and were not without some elements of the quality of leadership.

Both of them had served under supervisors of the old type, neither of them had any education in the relations between supervisor and men and the relations between different departments, so that they were unable to see the effects of their own mistakes and in fact did not vision them as mistakes at all.

With so many supervisors required in industry, it is obvious that they cannot be very different from the subordinates over whom they have charge, in education, in their knowledge of organization and capacity to understand the industrial relations between departments.

It is obvious also that the contact between their subordinates and themselves is intimate and of great importance. There is no present probability of any of the work of their education being undertaken by the public authorities, and it must be done either by industry itself or through the co-operation of industry. In any case, the improved efficiency of production requires the careful education of all such supervisors as to the organization with which they are working, the relation of the departments in such an organization, the systems and methods and the general causes.

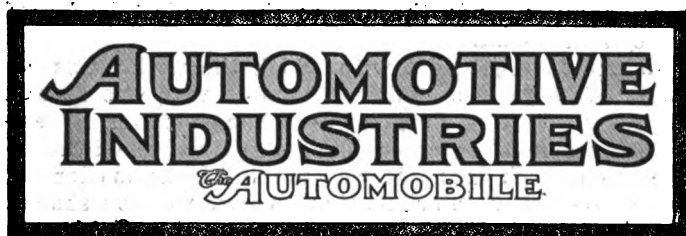
The Strength of Wood in Different Directions Relative to the Grain

IN his presidential address to the British Association for the Advancement of Science, Prof. C. F. Jenkin called attention to the fact that wood is anisotropic and that its grain may be used to locate three principal axes—along the grain, radially across the grain, and tangentially across the grain. It is curious that there do not appear to be generally recognized terms for these three fundamental directions. A very few tests are sufficient to show that its strength is enormously greater along the grain than across it. How, then, is an engineer to calculate the strength of a wooden member? There is no theory, in a form available for the engineer, by which the strength of members made of an anisotropic material can be calculated.

Suppose a wooden tie or strut is cut from the tree obliquely so that the grain does not lie parallel to its length. In practice it is never possible to insure that the grain is accurately parallel to the length of the member, and often the deviation is considerable. How much is the member weakened? This comparatively simple problem has been of immense importance in aeroplane construction, and, thanks to the researches made during the war, can be answered. The solution has thrown a

flood of light on many failures which before were obscure. If the tensile strengths of a piece of timber are, say, 18,000 lb. per square inch along the grain and 800 lb. per square inch across it (radially or tangentially) and the shear strength is 900 lb. per square inch along the grain—these figures correspond roughly with the strengths of silver spruce—then if a tensile stress be applied at any angle to the grain the components of that stress in the principal directions must not exceed the above strengths, or failure will occur. Thus we can draw curves limiting the stress at any angle to the grain, and similar curves may be drawn for compression stresses. These theoretical curves have been checked experimentally, and the results of the tests confirm them closely, except in one particular. The strengths at small inclination to the grain fall even faster than the theoretical curves would lead us to expect. The rapid drop in strength for small deviations is striking.

Similar curves have been prepared for tensile and compressive stresses inclined in each of the three principal planes for spruce, ash, walnut and mahogany, so that the strengths of these timbers to resist forces in any direction can now be estimated reasonably accurately.



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Automotive Industries—The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907, and The Horseless Age (semi-monthly) May, 1918.

Business and Government

IN all of the business conventions the writer has attended during the past few months there has been a very strong urge that all business men interest themselves more intimately in the affairs of government. The especial reason for this urge has been the more than apparent need for a revision of taxes.

In a recent address before the National Trade Association Secretaries, Alfred Reeves of the National Automobile Chamber of Commerce, spoke directly upon government and business. He said that after many investigations he had become convinced that the legislators and government department heads were making an honest effort to treat business fairly, to meet as intelligently as possible the problems presented, but that they lack the intimate knowledge of the several industries.

This is not surprising in the least. A man must be in and of an industry to know the intricacies of its problems. So we would suggest to all men in our

new industry that they offer their services, through a proper representative, in all matters of government. This plan should be vastly superior to waiting until a wrong action is started and then objecting. Let us be constructive and "bore from within" at all opportunities. It will be necessary at all times for the representatives of the industry to advise fairly, if they expect fair treatment in return.

Trade Information

QUESTION as to the legality of the interchange of information concerning prices, markets, production and other items of trade association activities will be definitely settled when the Supreme Court of the United States hands down a decision in the so-called Open Competition Plan involved in the appeal of the American Column and Lumber Company and other defendants mentioned in the injunction granted by the District Court of Western Tennessee on the ground that these members of the American Hardwood Association were engaged in a conspiracy to enhance prices in violation of the Sherman Anti-trust Act. The argument was heard recently and a decision is expected in January or February.

Inasmuch as a large share of association work consists of exchange of information, the Court's opinion in this case will have a far-reaching effect on all lines of industry. The injunction of the lower court restrained the members of the Open Competition Plan from interchanging information through the medium of market letters, discussions, and predictions concerning stocks, production and prices. The Government argued that no one thing in the plan was by itself unlawful but that the intent and result of the whole arrangement constituted a restraint of trade.

Judging from the inquiries of Justices McReynolds and Brandeis, the court was concerned solely with the question of intention and effect and whether or not the collective activities of the hardwood manufacturers participating in the plan were sufficient to eliminate or control competition. Justice Brandeis inquired if it was the position of the Government to oppose trade association activities through insistence that operations of dealers and manufacturers must be carried on without co-operation, and therefore, in ignorance of market conditions. The Assistant to the Attorney General, Mitchell, replied that the Department of Justice only moved against such activities when they could be condemned as suppression of competitive influences.

It is significant to note in this connection the comment of Justice McReynolds as to the legality of dissemination of trade information. "I am with you in the abstract proposition that the exchange of information is in itself lawful," he commented. The appellants contended that nowhere had the Government furnished evidence to show that there was an agreement or understanding between parties concerning the maintenance of prices. The Government claimed the slogan, "Co-operation, not competition, is the life of trade," indicated the purpose of the plan was to replace competition by co-operation and thus enhance prices.

Why Not All Push?

A TELEGRAPHIC symposium of retail automobile trade conditions is printed in this issue of AUTOMOTIVE INDUSTRIES. This review of conditions is, generally speaking, more hopeful than any similar review printed since early July. This indicates that a turning of the tide has come. We believe this to be in the main due to consistent efforts of the motor car manufacturers to better a bad situation and certainly, with a turn of affairs for the better, it is time for everyone to give a push on the uphill grade.

Almost daily we hear of manufacturers who have found time, after adjusting their immediate requirements to the changed conditions, to undertake the giant task of putting "pep" into their sales organizations. One of the largest producers of moderate priced cars has called a convention of all of the dealers, an expensive and elaborate function for a factory which has as many dealers as this one. Some parts manufacturers, we know, are increasing their sales and advertising forces with a view of helping through this period by lending encouragement where they can and with a view of keeping their records and order files in shape to be of the best use when delivery dates are reinstated on their books. Some of the accessory makers are going heavily for consumer advertising to again arouse the interest of the trade. The only regret of this situation is that this effort to push is not universal. This is an unusual opportunity for an inventory of the sales machine and for a caulking of the leaks.

It has been a contention of this publication for several months that the slow sales situation was largely due to a psychological condition and that a reflex would come. We are more firmly convinced that this was and is the situation, and now that this anti-buying wave is passing and that prices are of less importance than two months ago, there is an opportunity for constructive effort to aid materially in turning the tide. *Motor World* last week contained an excellent news story of one large dealer who had found instant response to an effort to sell cars.

A few days ago W. H. Booth, a vice-president of the Guaranty Trust Co., in speaking to the implement makers, told them, incidentally, that beginning last May there had been an unusual and unexpected market for investment bonds in small amounts. He spoke specifically of a large bond issue that had been disposed of in amounts averaging \$3000. This further bears out the idea that the non-buying situation was psychological. It was the idea of the people that it was time to invest, rather than buy something they could get along without.

Cannot you, by proper advertising and sales advances, convince the public that a motor car is an investment?

Suppose you should put on all steam in sales and not get direct results! We are not admitting that we think there is a possibility of a well-organized sales campaign flivvering now, but imagine that it was possible that it should. Would it be a loss? No!

Suppose, for instance, that you have 500 dealers and an average of ten salesmen to each dealer. Say each of these should call on five prospects daily for a week, and should make a detailed report of each visit. Then you would have 150,000 reports of contact with prospects. If the dealer had properly reported his efforts, you would then have a research into reasons why people are not buying that would be invaluable.

Why not all push? If not for sales, to find out how the pendulum is swinging.

Move Toward Better Business Gains

Sales Resistance Slowly Giving Way

Clearing of Election Uncertainty Helps Toward Stabilization— Few Markets Weak

NEW YORK, Nov. 8—Another survey by AUTOMOTIVE INDUSTRIES of trade conditions in the automotive distribution centers of the country discloses a general continuation of the improvement noted two weeks ago. In a few cases the upward trend was halted just before election but when the votes were counted the gain began again almost immediately. Regardless of the politics involved, the fact that election is over will have a stabilizing influence. More or less uncertainty always exists during a Presidential campaign.

The readjustment now under way is chiefly economic, however, and the return to normal conditions depends very largely upon the stabilization of prices in general at a level where sales resistance will end. In this connection the prices of automobiles make much less difference than do the prices of shoes, clothing, food and fuel.

In most cities aggressive sales campaigns are bringing results and it is evident that hard work will bring the reward which it always merits. While the larger dealers have taken their coats off and begun a sturdy battle to get business, the dealers in most of the smaller towns still seem to be waiting for business to come to them. This lethargic attitude is militating against them.

The upward trend of business is not confined to a few sections but is general. There has been no flood of orders but a greatly increased interest in motor cars, more prospects and more actual sales. These conditions prevail in New York, Boston, Atlanta, Columbus, Denver, Salt Lake, Louisville, Omaha, Cleveland, St. Louis, Buffalo, New Orleans, Indianapolis and San Francisco. The weakest markets are found in Minneapolis, Milwaukee and Des Moines. Business in Portland, Ore., and Chicago seems to be at a standstill.

Dealers and Salesmen to Help Boom Trade

BOSTON, Nov. 6—Motor conditions have improved in Boston in the last few weeks. With the election out of the way dealers are beginning to be optimistic. They feel that change of national administration means an end of uncertainty because the vote was so emphatic. Some dealers now are planning to build

INQUIRIES DISCLOSE REVIVAL UNDER WAY

COLUMBUS, Nov. 6—The recent improvement in the automotive business in Columbus and central Ohio continues. All local dealers unite in saying that there is a better feeling in trade circles, with sales showing up better every week. The lull occasioned by the price adjustment is gradually passing and in its stead comes a steady stream of inquiries. While business is not yet normal, it is showing a strong tendency to revive and is expected to improve from this time on. The purchasing power of the public is still good and there is a disposition to go ahead with purchases of passenger cars and trucks. The ending of the political campaign is also expected to stimulate trade.

up their organizations by adding salesmen and paying them salaries instead of commissions. Live dealers are taking advantage of the laying off by other companies of good salesmen to add them to their forces. In October, Massachusetts registered about 1600 motor vehicles a week, which shows people are buying.

Resumption of Orders Gives Dealers Hope

BUFFALO, Nov. 6—That expectation of further price reductions no longer occupies the prominent place it had a few weeks ago in the minds of prospective buyers was the substance of statements made to-day by local dealers. Would-be buyers, these dealers averred, are beginning to recognize the fact that further price cutting is not reasonably to be looked for, and as a result some of them are placing orders. They have not been numerous enough as yet, however, to greatly strengthen the market which, according to the average dealer, continues slow with little if any improvement noticeable in the last week. But Buffalo dealers are not apprehensive.

REDUCED CARS FAVORED

CLEVELAND, Nov. 6—Price reductions have brought a slight stimulation in retail sales in Cleveland, although trade is yet below normal. Machines that have been reduced in price are selling better than those that are retailing for the figure fixed months ago. Outside of Cleveland retail trade is not so good as in this city. Credit conditions are not good and this has slowed purchases, and the slow down in industrial production has hurt trade.

Demand Strengthens 60 Per Cent in Month

Increase in Salesmen and Better Crop Prices Develop Southern Trade

NEW ORLEANS, Nov. 6—Upward movement in the demand for passenger cars seems to be continuing steadily though dealers declare it will be difficult to estimate the percentage of improvement until the end of the month. Some dealers attribute the improvement to the increased number of salesmen most of them have put on, and others to the apparent stabilization of sugar, rice and cotton markets. H. B. Moody, secretary of New Orleans Dealers' Association, said:

"Better feeling is manifest among all local dealers, who are unanimous in statements that demand has strengthened at least 60 per cent in the past thirty days and that demand is continuing to strengthen at apparently about the same rate. All dealers and salesmen are working harder than ever before but are getting results. The coming winter season promises to be good for hustling dealers but bad for those who continue the practice of sitting at desks and waiting for orders to come in. The tendency of buyers to pay all cash for cars is marked. One dealer here sold fourteen passenger cars for cash the first week in November."

INDIANA FEELS WORST IS OVER

INDIANAPOLIS, Nov. 6—On the whole the recent improvement in trade conditions holds fairly good and is far ahead of the low level of the August and September slump. However, in the week preceding election business fell off somewhat for some dealers. Biddle Brothers, Franklin agents, sold four new cars last week and several used cars. Jones Whitaker Co., Chevrolet dealers, report that in October twenty-two cars were sold. Dealers here at the first annual convention of the Indiana Automobile Dealers Association feel that the worst is over.

IOWA CONDITIONS TIGHTER

DES MOINES, Nov. 6—Des Moines distributors agree that there has been no change for the better in the past two weeks. In fact, conditions during that period have been slightly tighter than the previous two weeks. This further tightening is attributed to the desire to wait to see what election would do to the country's financial situation. No material change is expected until Jan. 1.

Dealers' Campaigns Gather Force

Chicago Business Continues Hesitant

Aggressive Sales Campaign Helps Clear Used Car Stocks—Crop Prices Poor

CHICAGO, Nov. 6—Conditions in the automobile trade in Chicago remain practically unchanged since the last review with no indications of an improvement in the new car market. A very slight improvement is noted in used cars by some dealers, due to an aggressive sales campaign. The buying public is not yet satisfied on the point of price reduction and is still hesitating in making purchases.

Chicago is the distributing center for a vast agricultural section and distributors find the situation far from satisfactory, primarily because of the continued restriction on credits by country bankers and secondarily because of the low prices which the farmer is able to get for his produce.

This condition among the farming communities is reflected in the decreased earnings and the cutting down of forces of the mail order houses here. No effort is made at being optimistic, conditions among all dealers and distributors along the row being practically the same.

LOW COTTON, TRADE DRAWBACK

ATLANTA, Nov. 6—Improvement in the automobile sales outlook continues gradually, but low prices on cotton still retard sales. Improvement is more rapid in the Carolinas and in Florida. Dealers expect this condition to continue for thirty days and they then look for greater improvement and return to normal. They believe business will settle down now that election is over. George Hanson states that sales are gradually picking up and he believes conditions will be normal after the first of the year. Less improvement is noted among dealers in smaller towns which is due mainly to the low price of cotton.

USED CARS OFFSET CHANCES

LOUISVILLE, Nov. 6—The automobile situation in Louisville at present is good. Ford dealers report deliveries in not less than ten days time. Other dealers report new car business would be good if sales could be found for cars taken in trade. Sales of used cars are slow, thereby cutting down the sale of new cars to a great extent as buyers have old cars on hand to trade in on new cars. Conditions at this time have not been retarded but continue favorable. Several dealers are moving into better locations and are preparing for the winter months.

ST. LOUIS RALLYING AFTER BRIEF SETBACK

ST. LOUIS, Nov. 6—Motor car dealers in St. Louis report that trade was improving steadily until last week, when it received a considerable setback. One big dealer reported that it was the worst week in the history of his business. The dullness was due largely to the bad weather, however. This week has started out more auspiciously and considerable improvement has been noted. The election and the better weather conditions are believed to be responsible.

Weather Helps Trade in Omaha District

OMAHA, Nov. 6—Conflicting reports are made by Omaha dealers and distributors as to the condition of trade, but the general tone is of slightly more confidence than thirty days ago. Typical comment follows:

Nebraska Buick Co.—“There is no real change to report, but it could scarcely be worse in situation or outlook. Causes are the advent of the dull season and difficulty in retail financing. There is no prospect of betterment until after New Year's.”

J. H. Hansen, Cadillac Co.—“Business is slightly better. The weather is exceptionally good for this season and farmers are feeling better with the upturn in wheat prices following their crop-holding threat. The passing of election has stabilized business confidence.”

Hart Motor Co. (Ford).—“We have had a slight increase in business, but we are not sure whether it will be sustained or is the result of closing sales long in suspense. Trade in general appears seasonably dull.”

Guy L. Smith, Hudson Co.—“Trade is considerably better, but not to be compared with the same time last year. Financing and election uncertainty are responsible.”

DENVER OUTLOOK BRIGHTENS

DENVER, Nov. 6—Improved tone in the automobile market continues to strengthen gradually and a substantial gain is expected when the sugar beet farmers get their first pay on this year's sugar beet crop now being delivered to factories. Some dealers still are gloomy about money tightness in general and particularly about the standstill of wheat and other crops, but other dealers are cheerful because more people are looking and buying, and some enthusiastically predict a big forward movement soon in both cars and trucks.

Utah Finds Trade Greatly Improved

General Development Since August Meets Temporary Check in Election Interest

SALT LAKE CITY, Utah, Nov. 6—In spite of the fact that the election has been used as an excuse for everything from bank robbery to murder, the automobile and truck dealers of the intermountain country and Salt Lake in particular claim that for the past month their business has been retarded by the interest in the campaign.

The general tone of business conditions in the automotive world here is much better than during the summer months. The welcome change began in August and from every point came pleasing tidings and encouraging reports. The market continued to grow better until about a month ago, when, although not sliding backward, the motor world here came to a standstill and no great increase in sales was reported.

The consensus of opinion among dealers here is that from now on business will rapidly approach the point they wish for. They base their prediction upon the business which has been promised to them after election. All their prospects have stated that when the campaign issues faded into the background they would turn their attention to purchasing automobiles and trucks.

San Francisco Finds Noticeable Increase

SAN FRANCISCO, Nov. 6—Although there are plenty of cars in San Francisco warehouses, distributors of standard makes of automobiles express the belief that they will soon fade away under the demand which has already started. Rains throughout northern California, insuring better crop conditions for the farmer and relieving power shortage, brought smiles to faces of business men here. Dealers declare more people are on the row shopping and that an increase in business is noticeable. Franklin, Cadillac, Buick, Studebaker and Hupmobile are among those who declared the past month good. The used car market is unquestionably slow and dealers are uncertain as to prices to allow on trades. This is holding up many sales. All expect conditions to improve further now that election is over. The automobile show, which is scheduled for February, is expected to be the final push to put business back to normal and over the top into the prosperity column.

Makers Confident Low Mark Reached

Ford, Buick and Dodge Hold Up October Figures in Detroit District

DETROIT, Nov. 8.—Exclusive of Ford, Dodge and Buick production, only 10,432 passenger automobiles were built in the Detroit territory in October. This territory includes all of Michigan as well as the Overland and Willys-Knight plants in Ohio. This compares with 27,251 built in September, exclusive of the same three factories. The total produced in October was 124,439 compared with 139,290 in September.

The Ford factory reported a record month for October with 99,967 cars and trucks. The daily record was established Oct. 26 with a production of 4688. Dodge started October with a schedule of 625 daily and maintained it throughout the month. Buick built 12,690 in October but announces this schedule will be cut from 550 daily to 350 daily from Dec. 1.

Hupp, which had been running to capacity in spite of the slump, cut production from around 2500 a month to ten a day on Oct. 1 and the factory now is operating on that schedule. Cadillac maintained capacity production and put out 2000 cars in October despite a 25 per cent reduction in the number of employees two months ago. Increased labor efficiency permitted maintenance of the capacity schedule, according to Vice-president Layng.

A majority of the plants are taking advantage of the slump to take inventory and making no attempt at production. Oakland, which was down the greater part of October, will resume Nov. 15, according to President Warner. Chevrolet averaged 85 daily from Oct. 15 and will try to maintain that schedule indefinitely. Oldsmobile is taking inventory and will be down indefinitely.

Packard Works on Single Six

Packard is working hard on the new single six but is building only inclosed models of the twin six. Production for October was cut about 50 per cent from normal, which is around 750. Packard is building practically no trucks. Paige was about 35 per cent under the September output of passenger cars and did virtually nothing with trucks. Paige officials expect a slight improvement for November, however.

Studebaker is running full blast in its South Bend plant but was away off in production at its Detroit plant, the October production in which was 2600, or about 35 per cent under capacity. The Detroit factory is running only four days a week. Saxon and Scripps were down the greater part of October and their production was off 60 per cent. Hudson-Essex has been practically closed but will open some departments this week. Liberty and Columbia were

approximately 70 per cent off in October production. King built only about 30 cars in October before the receivership.

All executives report a slight upward trend in business, and with confidence returning throughout the country look for a marked improvement by the first of the year with the outlook good for a return to normal in the early spring.

The Gemmer Mfg. Co., which makes steering gears for sixty companies, has been down for two months but probably will reopen Dec. 1, according to Vice-president Wilder, who says the factories have practically exhausted their supplies in balancing inventories.

The Willys-Overland plant at Toledo closed Saturday but officials say some departments will be reopened in two weeks and the entire plant after a complete inventory.

(Continued on page 994)

Election Interest Affects Coast Sales

PORTLAND, ORE., Nov. 6.—The election has overshadowed buying interest in automobiles for the past week or ten days. Consequently there has been little activity in any line. Even Fords have been moving slowly.

This has temporarily offset the returning interest recently noted in motor cars following stabilization of the market after price drops. However, dealers here believe the election has cleared the air. For example, one distributor shortly before election had his salesman interview prospects as to their buying intentions. Sixty prospects said they expected to buy new cars if Harding were elected, while only three were intending to buy in the event of Cox's election. Discounting these by one third, he figures forty sales to these prospects alone.

Lower Price Hope Holds Sales Over

MINNEAPOLIS, Nov. 6.—Even optimists in the trade are not expecting much business before spring in automobiles, though some dealers are having nibbles and the enclosed car trade has perked up. In the cities in general there is little improvement in sales. In fact, enclosed car business involved some long trade. The money situation has not improved and people seem to be waiting for spring before closing.

Cuts in prices and guarantees against declines seem to have hurt business, as prospects are saying that the factories that can make such heavy cuts have been getting too much money and can make another drop before summer. It is a waiting game by the public and little buying is expected before the annual shows.

MASON CUTS TIRE PRICES

KENT, OHIO, Nov. 8.—The Mason Tire & Rubber Co. announces a 12½ per cent reduction in prices to consumers on all tires including fabric, junior cord and regular cord, tubes and all pneumatic, solid and cushion truck tires.

Harvester Prepares for Truck Demand

Export Orders Keep Company at Capacity—New Plants Soon to Open

AKRON, Nov. 6.—That the employed force at the International Harvester Co. truck works here would be greatly increased during the next year in the face of adverse general conditions, is the report from the offices. The increases will be the direct result of the completion of the Ft. Wayne assembly works, and the Springfield, O., speed truck works.

The Akron works are running to the utmost of their limited facilities to-day. Every available foot of space is being utilized and an additional building is now under construction. More men are in the employ of the company than at this time a year ago, and at this time a week ago even, and in spite of the great increase in the number of unemployed men in the country, the wage level has not been lowered.

The slump that is so prevalent in the automobile industry has not affected the Akron motor truck works in any way. The I. H. C. machines are finding ready markets all over the world. Export shipments are a big factor in the truck sales.

With the completion of the midwest assembly works at Ft. Wayne, the local plant will be changed over gradually to machine production completely. The space now utilized for assembly, body building and painting of the trucks will be used for machine shops, with a relatively greater number of employees. At the same time the unlimited assembly facilities of the 137 acre assembly plant will make possible the construction of many times the number of trucks now produced daily, with the resultant great increase in work for the Akron plant. All machined parts will be made in Akron and the truck will be built in Ft. Wayne just as soon as the plant there is completed, and that will probably be by next spring.

The Springfield speed truck works personnel is also being built up at the Akron plant to-day, and foremen are being schooled under actual production conditions in the work they will have to do in the new plant. The Springfield plant may also help to keep the local works busy, as many of the parts used in the new truck may have to be made in Akron. International Harvester officials and employees are most optimistic over the future of the local organization.

TRUCK MANUFACTURERS TO MEET

CHICAGO, Nov. 6.—The Motor Truck Manufacturers' Association will hold a convention in Detroit in connection with the meeting of the Motor Truck Sales Managers' Association on Nov. 18 and 19. Matters pertaining to the industry will be taken up and views exchanged on the problems of the individual members.

Business Reaction Studied by Reserve

Alternatives Facing Industry Discussed in Chicago Report— Public Must Re-enter Market

CHICAGO, Nov. 9.—In its monthly report, the Federal Reserve Bank of Chicago, for the Seventh Federal Reserve District which embraces in its scope the state of Michigan, pays special attention to the automobile industry, directing notice to the four alternatives which faced the manufacturer when the "public demanded just as good cars at 'lower cost.'"

It finds that prices are both higher and lower than a year ago and that they are higher than during the pre-war period.

"Advices indicate that transportation facilities as they relate to the automobile industry are better, but that fuel is considerably below the normal supply. Prices are reported from 8 per cent lower to 7 per cent higher than a year ago, and from 15 to 36 per cent higher than the pre-war period. Declines are reported in some of the raw materials but advances in others tend to offset the savings elsewhere. Wages continue firm but production is beginning to decline as evidence of overproduction and the strained credit situation begin to press prices downward.

"The automobile industry, confronted by the public demand for just as good cars at 'lower cost' has had to think fast and correctly or take the drastic penalty of temporary (or permanent) loss of trade prestige and 'goodwill,' as well as loss of current orders. The difficulty of meeting the situation was the more serious for the reason that manufacturers possessed of abundant inventories of raw materials, had paid for them the top prices and they had either to stand heavy loss on such materials or else face the peril of losing sales now and hereafter.

"In order to meet the situation, some of the manufacturers have adopted one or more of four expedients, namely, making a flat reduction in price, or announcing their intention of adhering to an announced price for a definite time, thus stabilizing the selling quotation, or guaranteeing the price for a fixed time, with a pledge that any reduction meantime shall be retroactive to current buyers, or making a temporary reduction in current prices until Jan. 1. The last named carries with it the intimation of a restoration of prices after the first of the year."

The review then goes on to say that interest in the Middle West is centered upon the question of how soon the public will "again enter the market and absorb goods for consumption."

In returning to the automobile industry it says:

"Those who have taken the step of cutting prices of their products, as for instance, one of the large motor companies expresses conviction that this pro-

cedure is quite as much for their own ultimate good as for the general welfare; that in the end the concern will earn a greater profit under the policy than by attempting to hold out against the inevitable.

"This class of manufacturers, as expressed by one of them, is proceeding on the idea 'that prices are coming down because they must—not because costs have been lower, but because business in this country cannot resume its normal volume and confidence until the adequate buying power of the dollar has been restored'."

Spring Sales Grow in Milwaukee Zone

MILWAUKEE, Nov. 6.—Recent improvement locally and throughout the state in the automobile market has been slightly retarded for prompt business, but spring delivery orders have been materially increased. Alfred H. Reeke of Nash, Tom McMillan of Overland, Jesse A. Smith of Hudson and Essex, G. H. Williams of Franklin, and Ford dealers all report October totals better than September in retail sales, and October satisfactory in comparison with a year ago.

Distributors still find interior dealers slow and uninterested in used cars. This market is dead, including enclosed jobs. Present buyers want new cars. Large dealers are making a rule that salesmen must dispose of one used car for every additional one taken in trade. State dealers are being notified that factories will restrict styles and not ship in advance of definite orders, and dealers are asked to order only for actual requirements. Everyone is confident of big spring business revival.

Goodyear Initiates Trade Acceptance Plan

AKRON, Nov. 8.—While no official statement has been forthcoming from the Goodyear Tire & Rubber Co., it is understood here that it has obtained \$10,000,000 in cash at 9 per cent and will have a balance of \$20,000,000 on trade acceptances from Becker & Co. and the Continental and Commercial Trust Co. of Chicago on a basis of trade acceptances. It is known that Goodyear is going after dealers' orders for spring on the trade acceptance plan in order to rush big orders in and negotiate loans on them.

HELD FOR STOCK DEPRESSION

CLEVELAND, Nov. 8.—Barton Pittman of Columbus has been held under \$2,000 bail for a hearing here after his arrest on a charge of having "unlawful intent to depress the value of the stocks and securities of the Templar Motors Co." He pleaded not guilty when arraigned. It is alleged that Pittman was able, by means of derogatory circulars, to buy up Templar stock at less than its market value and then re-sell it at a profit.

Publishers Approve Publicity for Show

Everything in Reason Promised Space by Association—Em- bargo Temporarily Lifted

NEW YORK, Nov. 8.—Newspapers have lifted the ban on automobile publicity for show week.

Information to this effect has been sent to the National Automobile Chamber of Commerce and the Automobile Dealers' Association. The notice from the Publishers' Association said everything within reason would be done to promote the interests of the show and the manufacturers represented there. There will be no more restrictions than in the past of the use of car names and companies.

No action has been taken by the publishers in regard to the embargo on automobile news at other periods of the year. As a matter of fact, the little news which has been used in the last few months has been of a little higher type than formerly was the case. Much of it was of an informative nature but there has been no relaxation of the rule against the use of names. Almost the only exceptions have been in the cases of price cuts, financial statements and failures.

The automobile interests propose to take the question up with the publishers again at an early date and see if the industry cannot be established on an equitable basis with the newspapers. It is contended that it should be treated at least as liberally as real estate, which is advertised to a much smaller extent. The theatres and professional sports offer another case in point. No attempt will be made to revert to the old type of publicity which appears, happily, to have gone into the discard permanently. Newspapers are not so hard pressed for space as they were a short time ago.

GASOLINE EXPORTS GROW

NEW ORLEANS, Nov. 9.—The exports of gasoline from New Orleans, mainly to Latin-America, have increased approximately 3000 per cent in the period between 1911 and 1919, according to figures just made public by the research bureau of the New Orleans Association of Commerce. In 1911, this port exported 251,098 gallons of gasoline, and in 1919, the total sent out through New Orleans was 62,295,024 gallons, or approximately 30 times the quantity exported nine years before.

ITALY LIFTS TRUCK BAN

WASHINGTON, Nov. 8.—The Italian restrictions on the importation of motor trucks into that country have been lifted, effective Oct. 29. This information is contained in a cablegram from Commercial Attache H. C. MacLean at Rome to the Bureau of Foreign and Domestic Commerce.

Overland to Stick to Present Models

Not Working on New Cars Says
Willys—General Motors
Rumor Denied

DETROIT, Nov. 6—During a visit to Toledo and Detroit early this week, John N. Willys took occasion to deny a report that the Overland is at work now on new model cars to be placed on the market, or that the company was planning to revise the model 90. Willys said unusually good sales for Overlands had continued during recent months in many districts, particularly in New York and the East. Willys sees promise of betterment of present business conditions and predicts a rally from the slump of the past few months after the first of the year.

C. A. Earl, vice-president of Willys-Overland, in denying reports that the company would stop production on the Overland Four, declared he was becoming tired of issuing denials of the many rumors that were being spread around the country regarding his company. He said there was no truth in the report that General Motors would take over the Willys interests, denied that it was the plan to stop production on Overland Four, and move the Chevrolet from Tarrytown to the Overland factory, and denied absolutely that the Overland company was being compelled to pay Ford Motor company a royalty of \$100 a car, on account of a patent infringement.

"Just say for me that Overland is in production and that our sales for the past few months have been gratifying, in consideration of the slump and its generally bad business conditions," said Mr. Earl. "Of course, no one can foretell the future, but we look for better business within the next few months, and with a hard, steady pull, I am confident the industry will come through in good shape. As for Overland, I am not the least bit discouraged as a result of present conditions but rather gratified at the outlook within the next 90 days."

IMPROVE TIER-LIFT TRUCK

CLEVELAND, Nov. 5—The Lakewood Engine Co. of this city has increased the lifting range of its tier-lifting truck to 96 in., and has also brought out a new model of truck embodying double lifting speeds for users handling light, bulky packages. This model has a lifting and load carrying capacity of 2000 lb.

TO MAKE SPENCER LIGHT CAR

DAYTON, OHIO, Nov. 6—The Research Engineering Co. of this city has increased its capital to \$200,000 in order to manufacture the Spencer air-cooled car, a small vehicle designed by its president, O. H. Spencer. Among the mechanical features of the car are a four-cylinder air-cooled engine, a new special de-

sign of transmission and cantilever springs all around. The car complete weighs about 1500 lb. and is to sell at \$1,200. Other officials of the company besides Spencer are Jay A. Weller, vice-president; Kenneth E. Hoy, vice-president; Thomas E. Garster, secretary; Elmer M. Silers, treasurer. A manufacturing site in Dayton is being looked for.

I. C. C. Order Releases More Flat Top Cars

WASHINGTON, Nov. 6—Improved movement of automotive shipments and road material is assured with the Interstate Commerce Commission's order today releasing several thousand gondola cars or cars equipped with racks from the exclusive use of coal shippers.

In amending Service Order No. 20 the commission excluded from the classification as "coal cars" gondola cars with solid sides and solid flat bottoms, having sides 42 inches or less in height, inside measurement, or cars equipped with racks. It is said that the revision was brought about through the persistent appeals of the steel manufacturers for additional equipment to move their products. The order will, however, make available more cars for the automobile trade, particularly the type of trucks and cars shipped on gondolas.

Directors Investigate Erie Rubber Company

SANDUSKY, OHIO, Nov. 8—Affairs of the Erie Tire & Rubber Company are in the hands of an investigating committee consisting of C. H. Walters of Anderson, Attorney D. F. Dunlave of Ashtabula and Judge Spencer of Lisbon, members of the board of directors, which will report in ten days. At the meeting of the stockholders last week Chairman Walters declared the company solvent. Accounts receivable amount to \$291,664 and the liabilities to \$281,043.81. Raw material, finished product, etc., are worth \$750,000. He alleged that Z. H. Roth, former treasurer, had drawn vouchers for \$37,000 since his resignation.

CREDITORS FILE BUS PETITION

NEW YORK, Nov. 6—An involuntary petition in bankruptcy has been filed in the United States District Court here against the American Motor Bus Co. by three creditors whose claims aggregate less than \$1,000. Janney, Steinmetz & Co. of Philadelphia have a claim of \$583.13 on six promissory notes; the Machinists Supply Co. of Chicago, \$240.96, and Charles H. Besly & Co., also of Chicago, \$47.50, for materials.

TO INCREASE TRUCK OUTPUT

PONTIAC, MICH., Nov. 8—Production of 400 trucks in December is the program mapped out by the General Motors Truck Co. It is expected operations will be resumed by Dec. 1 on practically a full time schedule.

Cleveland Presents St. Lawrence Views

White Official Sees Difficulties
Owing to Freezing and High
Insurance

CLEVELAND, Nov. 8—Many of the largest manufacturers of this city and the Ohio valley territory, who are following with keen interest the proposal to open the Great Lakes to ocean going ships, testified at the hearing here before the International Joint Waterways Commission, which is to report to the governments of the United States and Canada on the proposal.

Cleveland automobile manufacturers are keenly interested in the subject, and they had several representatives present to listen to the testimony. George H. Kelley, vice-president of the White Co., told the commission that his company naturally was interested in any proposal that would help develop foreign trade. His company was sympathetic and then he left with the commission these suggestions:

1. The Insurance rates from Montreal are considerably higher than from New York, so much so that they offset any advantage ocean shipping from the inland has over the rail-ocean shipping.

2. The ocean route from this city would be available but a few months in the year, while work must be done continually in the foreign trade department, if it is to grow.

H. E. Ashbruner, sales manager for the American Multigraph Co., of this city, gave testimony that was typical of that offered by the average witness. Ashbruner predicted that foreign trade in this section would develop to such an extent in the next few years that even greater railroad congestion would result, and that unless additional transportation facilities were provided manufacturers would suffer in competition with European made goods. He declared that the lesser number of handlings of goods by ocean shipping was a factor of immense value to the shipper, and he argued that the shipper could afford to pay from 3 to 5 cents more per cubic foot for ocean shipping than for rail-water.

Would Help Akron Plants

R. G. Kreidler, traffic manager of the Goodyear Tire & Rubber Co., Akron, told the commission that traffic between Cleveland and Akron in rubber goods was growing by leaps and bounds, and that in his opinion the proposed ocean route would help Akron rubber companies to develop foreign trade, although Kreidler made it plain that a number of problems would have to be solved before the project was complete.

American members of the commission are former Senator Obadiah Gardner, of Maine; former Senator Clarence D. Clark, of Wyoming; and William H. Smith, secretary. The Canadian members are Charles A. McGrath, Sir William Hearst and L. J. Burpee, secretary.

Ford Not Interested in Zeppelin Plans

Contrary to Policy to Join Syndicates, Says Mayo—Has Plans of Own

DETROIT, Nov. 8.—Reports that Henry Ford is interested in a syndicate which will finance a big Zeppelin dirigible program were denied to-day at the office of W. B. Mayo, his chief engineer.

The denial was based upon a story from Akron to the effect that Ford is backing a trans-Atlantic dirigible service, that he has a contract with the Zeppelins for the construction of huge airships in Detroit, that he is negotiating for the purchase of a new 1,100 ft. ship built by England and that a training field for dirigible pilots and crews will be established near Lakewood, N. J., by Ford and German interests as soon as peace with Germany is established.

The following statement regarding Ford's aircraft plans was authorized by Mayo:

"Mr. Ford has for some time been interested in aircraft development and expects eventually to become active. There is absolutely no truth, however, in the report that our company is interested in a plan to finance a dirigible program and a trans-Atlantic Zeppelin service. Neither Ford nor the Ford company has a contract for Zeppelin construction in Detroit and it is untrue that either has bought or is negotiating for an English ship.

"The Dearborn plant from which tractor production has been removed to the River Rouge now is being used as an experimental station. The eventual disposition of the Dearborn plant has not been determined but it may become a car shop for the Detroit, Toledo & Ironton Railroad. There is not the slightest intention now to use it for aircraft development. It is not the Ford policy to join syndicates and when Mr. Ford decides to engage in an aircraft development program it will be solely a Henry Ford enterprise. That is far in the future, however. We have too many other things to occupy our minds now."

CURTIS TO BUILD TRACTOR

LITTLE ROCK, ARK., Nov. 6.—The Curtis Motor Car Co. is arranging to manufacture farm tractors. The first model has been constructed and is on display at the factory here. A. W. Sloss, general manager, says active production will start in the next thirty or forty days.

TO BUILD REFRIGERATOR TRUCKS

SPRINGFIELD, MASS., Nov. 6.—That increased freight rates, shortage of railroad rolling equipment and other details resulting in an expensive, delayed and generally unsatisfactory service are likely to result in substitution on a large scale of specially designed motor trucks

for refrigerator cars in the handling of meat and other perishable food supplies for all but through and long distance hauls, is indicated in negotiations now under way for transfer of the old trolley wheel factory plant at Northampton to the Refrigerator Truck Co. of Boston. It is understood that details toward consummation of the deal are being worked out now. The plant has been rented for some time by the Boston corporation.

Advance-Rumely Makes Special Farm Truck

LA PORTE, IND., Nov. 6.—A 1½-ton truck, specially designed for use by farmers, has been brought out by the Advance-Rumely Thresher Co. of this city. It is equipped with a unit power plant, and is fitted with a grain type express body. By means of suitable extensions, a larger capacity can be obtained for hauling lighter loads such as forage, livestock, etc. The trucks are being produced in the Chicago plant.

The engine is of the heavy duty, 4 cylinder block type, of 3¼ x 5¼ in. cylinder dimensions. It has a removable head, and three point suspension. Ignition is by a high tension magneto with automatic impulse starter. A centrifugal type of governor is fitted, and is set to control the truck speed to 15 m.p.h. for solid tires, or 20 m.p.h. for pneumatic tires.

Engine lubrication is by the full force feed system, with a gear type pump, while chassis lubrication is by the high pressure grease system. Cooling water is circulated by the centrifugal pump, and the radiator is provided with a shroud over the fan. The final drive is by worm and worm wheel, two ratios being offered, viz.: 6.5:1 and 7.8:1. Thermoid-Hardy disk universals are used. The weight of the chassis with the solid tire equipment, without gasoline or water, is 3950 lb., and that of the chassis with body complete, 5,650 lb. Pneumatic equipment, 36 x 6 in. in front and 38 x 7 in. in the rear, is special. The regular tire equipment consists of solids, 36 x 3½ front, 36 x 5 rear. The wheelbase is 144 in.

LIBERTY COMPANY ORGANIZED

NEW YORK, Nov. 8.—The Liberty Mfg. Co. has been incorporated with \$3,000,000 common stock at Stratford, Conn., to manufacture the Cameron air-cooled engine for automobiles, trucks and tractors. Tests are being made of an exceptionally light weight car with a wheelbase of 105 in., which it is expected will be manufactured shortly.

CANADIAN FORD SLOWS DOWN

WINDSOR, ONT., Nov. 8.—The Ford Motor Company of Canada will cut its working time to four days a week, continuing for an indefinite period. General Manager McGregor feels it is better to keep the present staff employed part time than to lay off more men. Already 10 per cent of normal staff have been laid off.

Handley-Knight Car Placed on Market

Chicago and Detroit Distributors
Get First of Output—Price
Fixed at \$2,985

KALAMAZOO, MICH., Nov. 5.—The Handley-Knight Co. has started delivery on its new Knight car. This company was incorporated under the laws of Delaware Jan. 6, 1920, for 80,000 shares of no par value stock. Forty thousand shares of this were authorized for sale, netting the company \$25 per share. Ground was broken for the factory on April 10 and the first experimental car completed July 1. The first deliveries were to the Detroit and Chicago dealers on Oct. 31. The plant is an 80 by 800 ft. structure laid out for a possible production of at least 5000 cars per year. It is a saw-tooth building adapted particularly for assembly and is on a 40-acre plot, providing ample grounds for expansion. It is located between the Grand Trunk and Pennsylvania railroad systems with sidings to each, being in a particularly convenient position as regards shipping.

The new car is strictly an assembled proposition, the engine being the 4½ by 4½-in., four-cylinder Knight sleeve valve type, which has been made for several years at the Willys-Overland plant in Elyria. The car is equipped with Auto-Lite electrical system, Connecticut ignition, Tillotson carburetor, Borg & Beck clutch, Grant-Lees transmission, Thermoid-universal joints, Timken axles, Mather springs, Gemmer steering gear and Ohio body. It is mounted on a 125-in. wheelbase and sells at \$2,985 f.o.b. factory in the seven-passenger touring car form. The price of the seven-passenger sedan has not as yet been fixed.

The engine develops approximately 48 hp. at 1800 r.p.m. and the car is geared 4 5/11 to 1, the speed range being approximately from 3 to 60 m.p.h. The engine is provided with aluminum pistons and a 2-in. three-bearing crankshaft. The clutch is a 12-in. type and the propeller shaft diameter is 1¼ in. The drive is of the Hotchkiss type, the rear springs being 61 in. long. A feature of the springs is the large bolt on the front of the rear spring, which is 1¼ in. in diameter.

ROUSSEY-CENTLIVRE BUILDS

FORT WAYNE, IND., Nov. 8.—The new tire factory of the Roussey-Centlivre Rubber Co. of this city is now being erected. The site lies in the eastern part of the city between Lincoln Highway and the Nickel Plate Railroad and is considered an excellent location. The factory will be one story in height, 60 ft. wide and 240 ft. long. It will be the first unit to be erected, although plans have been prepared for a much more comprehensive and extensive plant. The concern is owned almost exclusively by five local capitalists.

America Predominant in Brazilian Car Imports

Assumes Big Lead in 13-Year Period

Statistics Show Greatest Trade Development in First Six Months of 1920

RIO DE JANEIRO, Nov. 6—There have been imported into Brazil from January, 1907, up to June 30, 1920, a total of 24,475 automobiles, according to the Automobile Association of Brazil, otherwise known as the Associacao Automobilista Brasileira. These figures are looked upon as the most accurate that have come from any source. Previous to January 1, 1907, no statistics were made, but the very limited number of vehicles imported previous to that time can be neglected so far as the general estimate of to-day is concerned. To this total of 24,475 should be added 1200 Fords which were imported in semi-knockdown condition, this giving a grand total of 25,675 imported vehicles. Previous to this year all Fords imported into Brazil were in a completely disassembled condition, but those now being received in semi-knockdown condition are included in the government import reports. These figures include cars and trucks.

Of this total 15,109 vehicles, which includes cars and trucks, have been imported from the United States, the next country figuring in these imports being France, from which 3018 were imported. France is followed by Germany with 2277, Italy with 1282, and Great Britain with 586. European importations were all previous to the war.

The following tabulation shows the complete importations from different countries from January, 1907, to June 30, 1920, with the exception that the 1200 Fords referred to are not included:

Argentina	115
Austria-Hungary	12
Belgium	271
Canada	1
France	3,018
Great Britain	586
Germany	2,277
Italy	1,282
Paraguay	4
Portugal	25
Spain	7
United States	15,109
Sweden	36
Switzerland	506
Uruguay	128
Unclassified	1,098
Total	24,475

When the importation of automobiles by years is considered, more were imported during the first six months of 1920 than in any other year. In these six months 5082 vehicles were imported, as compared with a total of 4537 for all 1919. Importations during 1912 and 1913



Great Potential Trade Territory Offered by Brazil

were largest of any year previous to 1919, as the following figures show. In interpreting the heavy increase in 1919 it should be remembered that the Ford Motor Co. opened its branch in Brazil in May, 1919:

1907	366
1908	297
1909	306
1910	735
1911	1,574
1912	3,785
1913	3,218
1914	744
1915	214
1916	521
1917	1,648
1918	1,448
1919	4,537
1920 (6 mos.)	5,082
Total	24,475

The ports through which most of the vehicles are imported into Brazil are Rio de Janeiro, located in the Federal district, which corresponds with Washington, D. C., and Santos, which is really the seaport of Sao Paulo. The 7458 vehicles imported at Rio were very largely

shipped into the interior of the country and not used in the Federal district. The same applies to Sao Paulo, where many of the vehicles were distributed into neighboring states. This also applies to Pernambuco, which imported 1149.

The following tabulation shows general distribution of imported vehicles throughout the states when these considerations are kept in mind:

Amazonas	132
Alagoas	29
Bahia	513
Ceara	72
Rio de Janeiro	7,458
Espirito Santo	4
Maranhao	76
Mattagrosso	22
Para	313
Parahyba	6
Parana	70
Pernambuco	1,149
Rio Grande do Norte	4
Rio Grande do Sul	2,765
Santa Catharina	27
Sao Paulo	9,968
Sergipe	1
Other states	1,866
Total	24,475

Industries Abroad Regaining Standing

Industrial Unrest Reported Vanishing—Trade With America Hurt by Exchange

NEW YORK, Nov. 5—An encouraging picture of conditions in Europe was given by A. C. Pearson, general manager of the *Dry Goods Economist*, in an address to-day before the heads of departments of the United Publishers Corp. He spoke from first hand information obtained on a two months' trip to the principal centers on the Continent and in England and Ireland. Mr. Pearson is a trained observer and has made many trips abroad. His purpose on this journey was to gain a first hand knowledge of the state of business in the countries visited with relation to the United States. His facts were obtained from leaders in industry, friends of long standing.

Post-war depression attendant upon deflation and readjustment are present in all countries of Europe to a greater degree than on this side of the Atlantic, although it is asserted the United States is responsible for the slump because it was here prices first began to drop.

One important factor in the curtailment of production abroad was the cancellation of orders from the United States and this has caused indignation, especially in England. This is due to the fact that a contract in the older countries is an obligation which cannot be regarded as a scrap of paper. It is negotiable at banks and always is regarded as an asset. Cancellations lead to the courts for adjudication. For this reason it is difficult for business men abroad to understand the American viewpoint, although they have accepted it in taking orders. Nevertheless they regard the cancellation of a contract as the evasion of a moral obligation.

Bolshevist Menace Vanishing

Mr. Pearson's observations led him to take an optimistic view of the future. He considers the menace of Bolshevism vanishing and that there is no serious danger of a dictatorship of the proletariat. As a matter of fact the wave of radicalism which has swept Europe has been of value to far-seeing employers. They have bowed to the necessity of taking their workers into their confidence and granted them a larger voice in factory management but they have seized the opportunity to instill greater enthusiasm into their employees and thereby increase production without a corresponding increase in costs.

The reaction of his trip in the mind of Mr. Pearson apparently was that in spite of all the obstacles with which they are confronted, the war-ravaged nations of the old world are making substantial progress in their struggle to "come back." Industry is dead in none of them. Depreciated currency and lack of raw materials are their chief problems.

Ramifications of the exchange situation were sketched impressively by Mr. Pearson. For all practical purposes, he said, the pound sterling could be considered at par in relation to the money of other countries while the American dollar is at a 50 per cent premium. French and Belgian francs, German marks, Czechoslovakian and Austrian crowns and Italian lira are far below par and their value in relation to sterling represents their comparative standing with England from an economic and industrial viewpoint.

Exchange Rate Hurts Pride

While British pride has been hurt by the depreciation of the pound as compared with the dollar, it has aided British manufacturers to gain a foothold in other countries in competition with Americans, for it is cheaper to buy the same goods in England with the pound at par than in America with the dollar at a premium. The same is true to a lesser degree of Spain, Holland and Switzerland which profited from the war and the value of whose money has not declined to such an extent as that of other countries, although not at pre-war levels as compared with the dollar. They are, however, practically at par in comparison with the pound sterling.

The exchange situation has reacted detrimentally for Americans both as concerns exports and imports, Mr. Pearson pointed out, and the sooner it is stabilized the sooner will American traders be welcomed abroad.

There are many opportunities for the marketing of American goods in Holland, Spain and Switzerland with some in England, but few at present in the other countries of Europe. This is particularly true of Czechoslovakia, France and Italy. Germany is very friendly to the United States for it hopes to rehabilitate itself through trade with this country. Its chief needs now are raw materials and finances. Its factories are busy on such raw materials as are obtainable and these goods are finding a ready market, especially in England.

BOYCE STARTS CANADA PLANT

NEW YORK, Nov. 8—Owing to the increasing demand for its product in the British dominions, the Boyce Moto-Meter Co., Inc., of Long Island City, has established a Canadian factory at Hamilton, Ontario, the largest manufacturing center in the Dominion. Its modern factory building is located on the main line of the Grand Trunk and Canadian Pacific Railroads. The general manager of the plant will be Samuel E. Ryder, who has been with the Detroit branch.

BRITISH BODY MAKER EXPANDS

LONDON, Oct. 28 (*Special Correspondence*)—Davidson (Trafford Park) Ltd., of which Marshall Stevens, M. P., is chairman, is about to start production of four special standardized Ford bodies for sale through the trade, and will quote for designs for other chassis in lots of not less than 500 bodies.

British Car Makers After Foreign Trade

Plan Propaganda Campaign— Will Use Movie Films as Experiment

LONDON, Nov. 6—According to the American Chamber of Commerce in London, British motor manufacturers are about to start new forms of propaganda in order to push forward the sale of British motors in overseas markets. Experiments are to be made with cinematograph films as an initial step.

This announcement was made at a meeting of the Imperial Motor Transport Council, by the Secretary of the Department of Overseas Trade, who states that Britain was very much behind other countries in the utilization of films for trade purposes. It was also pointed out that the present cost of maintaining a large stock of demonstration cars and sending them round the world was much greater than the cost of producing and developing films.

That there is need for propaganda is evident judging from the statistics available as to British imports and exports of cars. Although the general returns of British foreign trade for September show decreased imports, a considerable number of cars and chassis are still being imported.

Imports of commercial motor vehicles which are duty free were very high during September, Germany heading the list with 416 complete vehicles, America second with 185, Italy and France being almost level with 93 and 91 cars respectively. As regards imports of passenger cars on which duty is payable, America heads the list with 968 complete cars, practically two-thirds of the total imports, France coming next with 107 complete cars. The majority of these cars is said to be the lower priced cars, which suggests that there is still a demand for motor cars costing from £250 to £400.

Standard Parts Plan Gets Final Approval

CLEVELAND, Nov. 11—Stockholders of the Standard Parts Co. at a meeting here yesterday ratified the refinancing plan proposed by the stockholders and creditors' committees under which the company will get \$10,000,000 additional capital. Under the plan stockholders will subscribe \$4,000,000 to Class A preferred stock; investment brokers will underwrite \$3,000,000 of preferred stock and the banks will provide \$3,000,000 credit. Stockholders already have subscribed one-third of their shares and predictions were made that the receivership will be lifted by Dec. 1.

Five plants of the company will be sold and a part of the proceeds will be used to retire prior lien preferred stock. These plants are the Cincinnati Axle Co., an axle and a spring plant at Canton, the American Ball Bearing Co., Cleveland, and the vehicle spring and axle plant at Connorsville, Ind.

Makers Confident Low Mark Reached

Distributor Reports Show Upward Trend—Employers and Labor on New Basis

(Continued from page 988)

Reports from distributors throughout the country, factory executives say, indicate an upward trend with a renewed demand which is expected to become noticeable by Dec. 1 and plans now are in preparation for resumption in many factories on that date.

Aside from a few of the smaller companies which have fallen by the wayside the industry has been able to weather the storm and with the crisis believed passed there is every hope that all will be able to come through. In fact leading men in the industry have turned from the darker side of the picture. Elimination of the hurly burly attitude and the inclination to get down to a sane business basis appears to permeate the industry.

A material cut in wages upon resumption in all plants which have been closed is believed certain with every indication that employees will be willing to get back on the job at reduced wages.

"We are in the happy position now of being able to tell the employee how we want our work done," said an official of Lincoln Motor Co. "There is a marked difference between the attitude of the employee to-day and three months ago. The wage reduction which it would be most natural to expect will not have the effect of antagonizing labor for employees are human and know that stabilization of conditions means reduction all along the line."

Production Cut in Half

Dort was off about 40 per cent and Paterson about 50. E. A. Nelson Motor Car Co. did not resume production Nov. 1 as planned. Lincoln Motor Co. did not get into production until the last few days in the month. Last week Lincoln production was maintained at the rate of 25 a day and this week the schedule will be increased to 35 with an effort to increase the output each week. Handley-Knight at Kalamazoo is just starting production, the first Handley-Knight car in Detroit having been put on display in the salesroom. Jackson Motors Corp. and Briscoe were off about 60 per cent in October. Barley Motor Car Co., which built 125 Roamers in September cut the October schedule to 78. Lorraine Motors Corp., at Grand Rapids, built 15 cars during October and officials reported few encouraging indications for the future.

Production at the new plant of the C. H. Wills Co., at Marysville, will begin Jan. 1. Though no official statement has been made it is believed to be the plan of Wills and his associates to start on a schedule of about 250 a month, increasing the output as demand increases.

In the truck end factory officials gen-

PIERCE-ARROW READY FOR 1921 BUSINESS

BUFFALO, N. Y., Nov. 8—When his attention was called to-day to the drive being made in Wall Street against the stock of the Pierce-Arrow Motor Car Co., the following statement was made to "Automotive Industries" by Col. Charles Clifton, chairman of the board of directors:

"The Pierce-Arrow Motor Car Co. has devoted recent months to preparation for production of new lines of both trucks and passenger cars. During this period shipments have been limited. The company will enter upon 1921 in an unusually strong position to secure a liberal volume of business. No new financing is contemplated."

erally have declined to give out any figures. Federal is keeping up at the rate of about 400 a month and Republic reports a schedule of 100 a month is being maintained. In the majority of plants, however, efforts are being devoted to disposition of trucks on hand and in transit with no effort at production except in cases where demands justify continued manufacture.

Ferry Heads Syndicate Negotiating for King

DETROIT, Nov. 9—Negotiations looking to the sale of the King Motor Car Co. are continuing. Well supported reports declare that D. M. Ferry, seed manufacturer and chief owner of the Crosstown Corp., King distributor in Michigan, will take over the plant. D. D. Calvert, new factory manager, admitted a syndicate of Detroit men headed by Ferry will in all probability become the new owners. Ferry declined to make any statement.

Calvert, former factory superintendent, has succeeded R. G. Hendricks as factory manager under the Detroit Trust Co., receivers. Hendricks and W. R. Wiley, chief engineer, have left the King organization. Neither announced their future plans.

DU PONT REDUCES PRICES

WILMINGTON, DEL., Nov. 9—New factory list prices of du Pont automobiles are announced as follows: Touring car, \$3,400; roadster, \$3,400; suburban sedan, \$4,900; touring sedan, \$4,900. The new prices now are in effect. They represent a decrease of \$600 in the open models and \$700 in the enclosed cars.

TO STOP ALCOGAS PRODUCTION

NEW YORK, Nov. 9—The United States Industrial Alcohol Co. announces that it will discontinue the manufacture of alcogas, its motor fuel. It is said to be impossible to satisfy the demands of the trade for alcohol and produce alcogas at the same time.

Adolf Pricken Held Under \$50,000 Bail

Hamilton Motors Head Charged with Larceny in Warehouse Stock Sales

NEW YORK, Nov. 9—Adolf Pricken, president of the Hamilton Motors Co. of Grand Haven, Mich., and of the Coastwise Warehouses, Inc., in this city, was held in \$50,000 bail to-day on an indictment charging him with grand larceny in the second degree. The real charge against him is that he operated a "get-rich-quick" scheme by the sale of stock in his warehouses. His arrest disclosed that he had served two prison terms but that he began life anew five years ago and in the interim has accumulated a fortune estimated at \$1,000,000.

A dispatch from Grand Haven quotes W. G. Jarman, treasurer and general manager of Hamilton Motors, as asserting that the arrest of Pricken will have no effect on the affairs of the company. Jarman declared Pricken would be ousted from the presidency as soon as action can be taken. He denied that Pricken was the financial backer of the company but asserted that he was elected president last March upon his agreement to take a considerable portion of the stock. This stock agreement never has been fulfilled, Jarman declared.

Hamilton Motors has been operating about three years, making a few Apex trucks each month, but has been down for the last two months and still is out of production.

In connection with his warehouse venture, Pricken organized the Thirty-fourth Street Stores, Inc., Washington Street Stores, Inc., Charlton Street Stores, Inc., and Jayne Street Stores, Inc. As the result of investigations made by the district attorney of Kings county of complaints made by stockholders it has been found, it is alleged, that some of the corporations in which stock was sold were "paper companies" and their securities worthless.

District Attorney Lewis said many persons bought this stock upon the representation that it would return guaranteed dividends of 50 per cent a year. He stated that about \$500,000 worth of stock was sold and that the purchasers were widely scattered, some of them living as far away as Maine.

His attorneys deny he ever promised 50 per cent returns to investors, but did pledge 1 per cent a month, promising to buy stock back at par. It is understood his warehouses have been very profitable.

TO INCREASE CAPITAL STOCK

PHILADELPHIA, Nov. 9—The Interlocking Cord Tire & Belt Co. of Magadore, Pa., will increase its capital to \$5,000,000 following its purchase of the Canton plant of the Republic Rubber Co., the Trumbull Tire & Rubber Co. of Newton Falls and the Ashtabula plant of the Pearce Tire & Rubber Co.

Big Sales Campaign to Start with Shows

N. A. C. C. Directors Decide Co- certed Effort Then Will Re- store Normal Trade

NEW YORK, Nov. 11—Concerted and united effort on the part of manufacturers to make the national automobile shows this winter the greatest ever held was decided upon yesterday by the directors of the National Automobile Chamber of Commerce at their monthly meeting here.

This effort will be concentrated in an advertising campaign designed to promote sales and to enthruse dealers. Most car makers will use very liberal space in the period around show time. Their appeal will be directed not only to potential purchasers but to their dealers upon whose efforts so much of their own success depends. In the aggregate the campaign probably will be one of the biggest ever conducted by the industry.

Dealers are expected to attend the New York and Chicago shows in droves and the manufacturers will take advantage of every opportunity to infuse into them an enthusiasm and optimism which cannot fail to bring results in actual sales. There is a conviction throughout the manufacturing end of the industry that the volume of sales which will result from the coming shows will be sufficient to send factories ahead at full steam and give the industry such an impetus that the present slump soon will become only a memory.

Almost every manufacturer already is making plans to put pep into his dealers. In most cases this will take the form of dinners at which there will be inspirational speakers.

Pending the completion of details of these campaigns aggressive work is to be started at once. Assistance and encouragement will be given to dealers and they will be vigorously supported in their sales efforts. Several factories have already instituted such work with good results, in both cars and trucks.

Keep Plants Mobilized

Conservative optimism marked the meeting of the directors. They were convinced that by the end of the shows the industry will be well on the way to normal, but they have no illusions as to the problems which still confront them. They expect it will take some time to work out these questions. Most of them are financial in their nature and involve keeping their organizations and plants mobilized for instant action when the right time comes.

A committee representing the Motor and Accessory Manufacturers Association conferred with the directors with the result that there was a further strengthening of the co-operative spirit. It was conceded that each branch of the industry must bear its share of the burdens at this time.

SON OF YAQUI CHIEF IS STUDYING TRACTORS

NEW ORLEANS, Nov. 8—Cajeme Mori, son of the chief of the Yaqui Indians, who recently made a peace treaty with the Mexican authorities after 300 years of intermittent war, is at Louisiana State University and Mississippi Agricultural College, studying modern farming methods for a few weeks, prior to purchasing several tractors to take back to the farm reservation given his people.

Receivers Are Named for Ericsson Company

BUFFALO, N. Y., Nov. 9—William A. McDougall and Robert E. Powers have been appointed receivers of the Ericsson Mfg. Co., manufacturers of magnetos and other electrical appliances, with a plant at 1100 Military Head.

The appointment was made by Federal Judge Hazel on the petition of a foreign creditor represented by Attorney Carl H. Smith, who also is secretary of the company. The foreign creditor is Allamanna Telfonaktiegalaget L. M. Ericsson, a Swedish concern.

The proceeding was a petition in equity, the papers plainly stating that the petitioners are of the opinion that the Ericsson company is solvent. It was with this point in view that McDougall and Powers were appointed receivers, it being the plan as at present outlined for the receivers to carry on the business. The receivers are under joint bond of \$50,000.

Smith, while declaring that the financial affairs of the company would be straightened out so that none of the creditors would lose a dollar, says that the general slump in business, coupled with the low exchange rate now in force, is responsible for the action taken. It is the plea of the petitioner that the appointment of receivers is the best thing for the company. There is no allegation of bankruptcy in the petition. According to the petition on file with the clerk of the U. S. District Court, the Ericsson company's indebtedness to A. T. L. M. Ericsson is \$50,000.

The Ericsson Mfg. Co. made the Berling magneto during the war. This magneto went into all government airplanes. The inventor of the Berling magneto is W. C. Berling, vice-president of the company, who resides in Kenmore.

MOTORS PLANT RE-OPENS

DETROIT, MICH., Nov. 9—The Continental Motors Corp. re-opened its plant at Muskegon yesterday after a shutdown of three weeks. Normal production is expected inside of a month. Officials say the re-opening is justified by specifications outlined by automobile manufacturers and the prospect of a resumption of manufacturing in all plants around Dec. 1.

Willys Negotiating \$30,000,000 New Cash

New Funds to be Used for Work- ing Capital and to Finance Inventory

NEW YORK, Nov. 11—Negotiations for the flotation of \$30,000,000 in new securities have been begun with local bankers by the Willys-Overland Co. What form these securities will take has not been determined. It is expected the Chase Securities Corp. and Blair & Co. will be the bankers chiefly concerned in the transaction. The corporation has no funded debt and under the terms of the agreement with preferred stockholders no mortgage can be placed without the consent of three-fourths of the outstanding preferred stock.

The new funds will be used for working capital and to finance inventory. Sale of 600,000 shares of common stock last March netted the company \$12,000,000.

At the offices of John N. Willys all information regarding the transaction was refused. It was admitted, however, that negotiations were pending although they will not be completed for several days.

Chrysler and Willys Sales to Be Separate

NEW YORK, Nov. 11—The Chrysler Motor Co. has been incorporated to take over the distribution and sale of the new Chrysler car. This disposes of the report that it would be handled by the Willys-Overland sales organization. General sales offices have been established at the plant in Elizabeth, N. J. The company contemplates the establishment of distributing points to keep pace with production rather than a general distribution of sample cars.

MORSE OPENS DETROIT BRANCH

DETROIT, Nov. 6—Morse Chain Co., Ithaca, N. Y., manufacturers of rocker joints silent chain, used for power transmission, has established a Detroit branch factory devoted exclusively to the manufacture of silent chain sprockets and the Morse adjustment. The local branch will be under the management of F. C. Thompson, with F. M. Hawley as chief engineer, and C. B. Mitchell, factory manager.

FORD GETS WATER POWER

DETROIT, MICH., Nov. 9—Henry Ford and his son have acquired the Dexter flour mills and Huron river power rights at Dexter, near Ann Arbor, at a price not announced. The deal conveys the power right for a long distance above the Dexter dam, officials say.

VICTOR TIRE REDUCED

SPRINGFIELD, OHIO, Nov. 11—The Victor Rubber Co. announces a reduction of from 12½ to 15 per cent in tire prices, effective immediately.

N. A. C. C. Takes Stand for National Roads

New Platform Would Devote Motor Fees to Maintenance Only—Truck Men Meet

NEW YORK, Nov. 10—A new platform constituting a declaration of its principles on the subject of highways was presented to the Highways Committee of the National Automobile Chamber of Commerce yesterday by Pyke Johnson, secretary of the committee. It will supplant the original platform which was adopted in 1912 and is designed to meet more modern conditions.

The platform asserts the belief of the N. A. C. C. in a national highway system built and maintained by the Government, with inter-county or State systems maintained by the States and district or county systems maintained by the counties.

It declares that motor registration fees should be set aside for maintenance uses instead of construction inasmuch as registration fees are recurrent and maintenance charges constitute a recurrent tax. It also declares for an adequate centralized engineering control with the personnel adequately paid.

Snow removal, the platform asserts, should be an ordinary item of maintenance.

Another plank calls for the systematic and scientific development of highway engineering.

Attention also is called to the importance of promoting the development of improved highways in other countries. In this connection Johnson stated that the Federal Bureau of Roads had under preparation pamphlets telling of the best practices obtaining in this country in road building which will be translated into Spanish and other languages for world-wide distribution. The Bureau of Roads also has in preparation a map of the snow belt in the United States showing the most important highways. Government action in this respect will be purely advisory, however, and the actual work must be done by the States and counties.

Wants More Traffic Engineers

Importance of maintenance is one of the chief points covered in the new platform. It is contended that there should be a traffic engineer in every state highway department in the country.

A constructive program for the guidance of every interest in the country devoted to the development of improved highways will be considered at a meeting to be held in Washington next month under the auspices of the Bureau of Roads.

One of the most important movements ever undertaken for the development of good roads will be set in motion here tomorrow when a highway committee of the engineering division of the National Research Council will be formed. Its purpose will be to refer to colleges and

BAY STATE HONORS AUTOMOBILE MAN

BOSTON, Nov. 6—Congressman Alvan T. Fuller, Eastern New England distributor of the Packard car and one of the pioneers in the automobile business, broke up the line of succession of the speaker of the house acquiring lieutenant-governorship, by butting in for nomination and winning out because it was time for a business man to be in the office instead of a politician.

He was endorsed by the motor car trades of Greater Boston and President Jesse A. Holton of the Bay State Automobile Association, at a meeting held after the election, expressed the pleasure it has given automobilists in general to know that a man so closely associated with motoring had obtained the position.

universities various problems of highway research for analysis and investigation.

The highways committee discussed at considerable length the status of the Townsend bill, which will be called up in committee at the coming session of Congress. Unless action is taken on it at this session it is highly unlikely there will be any Federal legislation before 1923 because the impending extra session will consider only major questions, such as peace and taxation and there will be time to take up highway legislation at the short session which will follow. It is hoped that authorization will be given at the coming session for the appointment of a Federal Highway Commission to lay out a system of roads and then get appropriations to build them at some later date.

The motor truck committee of the N. A. C. C., at a session yesterday, discussed the problems peculiar to that branch of the industry, particularly the problems of the used truck which is interfering seriously with sales of new vehicles. An investigation also was begun to learn the source of propaganda which is being carried on in country newspapers against the motor truck on the ground that it is destroying highways without bearing an adequate tax for their maintenance.

HONORS 50 YEARS OF SERVICE

ALDENE, N. J., Nov. 6—The Watson-Stillman Co. recently presented to Walter Watson a check for \$1,000 upon completion of fifty years of service with the company as a machinist. Walter Watson was a brother of Thomas H. Watson, who was a member of the firm at the time of his death in 1896. The record of the presentation says that the check was given because "his record as a machinist has shown him to be highly skilled, industrious, faithful and loyal." The booklet issued in commemoration of the event names nine twenty-five year men.

Sales Consolidated by Tire Companies

Sterling and Empire Organizations Taken Over by Rubber Corporation

NEW YORK, Nov. 6—The entire sales and selling organizations of the Sterling Tire Corp. and the Empire Rubber & Tire Co. have been taken over by the Rubber Corp. of America, which has been formed by the two companies in co-operation with New York banking interests. In all other respects the manufacturing companies remain separate and distinct as before, there having been no change in the controlling interests.

The object in forming the new sales company was to increase efficiency and secure economy in branch operation; to maintain larger stocks of goods in centrally located warehouses; to consolidate advertising effort and to relieve the heads of the manufacturing departments of all details of selling and financing sales.

The organization of the Rubber Corporation is as follows:

President and general manager, Francis I. Reynolds, formerly a sales manager for the United States Rubber Co.; vice-president and advertising director, Charles Austin Bates, chairman of the executive committee of the Sterling Tire Corp.; treasurer, William M. Pepper, a banker.

The directors are General C. E. Murray, former president of Empire Rubber & Tire Co., C. E. Murray, Jr., vice-president and treasurer of the Empire company; William T. Baird, president of the Baird Rubber Trading Co., New York, and Joseph A. Miller, director and treasurer of Sterling Tire Corp.

General offices of the Rubber Corp. of America will be at 240 West Fifty-fifth street, New York, with branches in Boston, Philadelphia, Pittsburgh, Buffalo, Chicago, Kansas City, Atlanta and San Francisco. Sterling branches in most cities will become distributors for the Rubber Corporation.

NEW PLANE RECORD SET

NEW YORK, Nov. 8—Advices from Paris state that on Nov. 4 Captain de Romanet, the French aviator, in a Spad-Hispano airplane, flew one kilometer at the speed of 309 kilometers an hour. This broke the world's record of 292.82 kilometers, made by Sadi Lecoq, the winner of the recent James Gordon Bennett Cup race.

WATSON TRUCK ORGANIZED

CANASTOTA, N. Y., Nov. 9—The Watson Truck Corp. has been incorporated with an active capital stock of \$2,150,000. The incorporators are A. A. Kessler, H. Casler and J. Souter. The company is a reorganization of the Watson Products Co. which was itself a reorganization of the Watson Wagon Co.

INDUSTRIAL NOTES

White Mfg. Co. has been formed and has purchased the business of the Goshen Motor Works at Goshen, Ind. The new company will return to the production of the Goshen two-cycle marine motors making two single cylinder and two double cylinder models.

Falls Rivet Co., Kent, Ohio, has purchased the cotter pin business of the Ohio Wire Goods Co., of Akron and the machinery used in this department has been removed to the Kent plant. The remainder of the Akron plant remains intact.

Haywood Tire & Equipment Co., Indianapolis, is planning the establishment of branch schools in all parts of the United States, to teach the Haywood system of tire repair to men contemplating entering the business.

Lafayette Tool & Equipment Co., Lafayette, Ind., has appointed Russell, Holbrook & Henderson, Inc., with sales offices in New York and Cleveland, as sole agents in the United States.

Milburn Wagon Co., Toledo, will erect a new plant on the site of its former works, which is designed to give it more than treble the present capacity for electric automobiles.

Carriage Factories, Ltd., has concentrated its carriage business at the Alexandria plant and devoting operations at the Orillia plant more in the direction of motor accessories.

Schwartz Motor Truck Co., Reading, Pa., will build a one-story factory and office building at a cost of \$40,000.

Prest-O-Lite Co. has started work on its \$150,000 plant at Cambridge, Mass.

FIRST YOUNG TRUCKS BUILT

CLEVELAND, Nov. 8—Young motor trucks, built in the plant of the Young Motor Truck Co., this city, made their appearance here last week. Offices of the corporation were moved into the plant last Wednesday, and the company expects to get into full production by Nov. 25.

The company was organized July 28. It already has built and shipped two of an order of twenty-five Young trucks, which are to be used by a company operating a silver mine in the Mexican interior. The Young truck is a duplicate of the Giant truck and is built under license to embody all its features.

MANSFIELD SELLS CAPACITY

AKRON, Nov. 8—The Mansfield Tire & Rubber Co. at Mansfield, Ohio, reports the booking of orders for tires amounting to \$1,000,000. It is also reported by the company that these orders will enable the plant to operate at 100 per cent capacity until the spring months without additional business. The company recently laid off a considerable part of the force, but will now resume day and night shifts in full force.

CUTLER-HAMMER BUYS PLANT

NEW YORK, Nov. 8—The Cutler-Hammer Mfg. Co. of New York and Milwaukee has acquired property at Southern Boulevard and 137th Street as an additional plant for the manufacture of "thermoplax" and "pyroplax" molded in-

sulation. The 5-story building on the site has been completely equipped with presses for this work. When working at capacity the plant will have a production equal to the insulation plant at Milwaukee, which has been running night and day for the past two years. The New York factory will take care of the Eastern business. F. J. Boller, formerly of the insulation department, will be in charge.

Dixie Rubber Officers
Must Appear in Suit

MEMPHIS, TENN., Nov. 8—The suit brought by the stockholders of the Dixie Rubber Co. against L. C. Cadenhead, president of the corporation, and four directors, will be heard on its merits in chancery court at a date not yet set. A demurrer filed by the defendants was dismissed by the chancellor with the understanding that they be given a reasonable time to file their answer to the original bill.

In their bill the stockholders ask that Cadenhead be deposed and a receiver appointed on the ground of gross mismanagement. Counsel for Cadenhead argued in his demurrer that the case should be dismissed on ground that they had failed to seek redress from the directors and that they should have gone into court only as a last resort.

The stockholders allege in their suit that Cadenhead also is president of L. C. Cadenhead & Co., brokers, and that he caused an illegal contract to be entered into between the two companies, without the knowledge of the stockholders, whereby the L. C. Cadenhead Co. would be paid a commission of 25 per cent on all stock sold. It is alleged further that Cadenhead and another director bought a large amount of the stock of the rubber company at par and sold it at \$150 a share to applicants who thought they were buying the stock from the company. It also is asserted that Cadenhead and his associates paid themselves 25 per cent commission on these transactions out of the cash assets of the company.

COLUMBIA TIRE SUED

AKRON, Nov. 8—Suits have been filed in Common Pleas court here by the State Savings & Trust Co. against the Columbia Tire & Rubber Co. of Columbiana, Ohio, to recover on two promissory notes. Both notes, according to the papers in the case, were made payable to the Akron Seamless Rubber Tube Co. which is also named as defendant. One note for \$1,468.08 is dated Aug. 15, 1920, and the second for \$2,534.33 is dated Aug. 17, 1920, but maturing at 60 days. The bank alleges payment was refused by the defendants.

REEVES TO ADDRESS A. E. A.

NEW YORK, Nov. 6—Alfred Reeves, general manager of the National Automobile Chamber of Commerce, will address the Automotive Equipment Association at its convention in Chicago Nov. 17 on "Future Prospects in the Automotive Industry."

METAL MARKETS

FROM a broad economic point of view, the downward price adjustment still in progress in the iron and steel markets undoubtedly is preferable to a sudden reduction from the inflated war and boom prices. The immediate effect of this gradual deflation, however, is much on the order of a man trying to pull a tooth without the aid of a dentist. Every jerk at the molar hurts, and there are an infinitely greater number of them than there would be if the operation were performed in a trice with a pair of forceps.

Contrast the situation in the copper market, for instance, with that in pig iron. When the red metal went to around 14½¢, it was recognized by the most timid buyers that every bit of the swelling had been removed from the price and, as a result, a modicum of buying got under way, relieving the market of its sickly pallor. Pig iron, on the other hand, is traveling downward so slowly that buyers have little faith that any of these gradual recessions will be the last.

To a certain extent the same feeling prevails with reference to steel prices. The report that Henry Ford contracted for between 15,000 and 20,000 tons of black sheets with a Youngstown district rolling mill at below 5¢, failed to engender among automotive purchasing agents a feeling that the time for anticipating their wants had arrived. Moreover, continuing discussion in certain quarters of the sheet industry of the "sanctity" of their contracts or rather their contract prices, is not designed to whet the zest for commitments on the part of the automotive industry until the specter of blank order books compels a more reasonable attitude among those sheet makers who, rather than face the situation with a broad smile, as other branches of the steel industry have done, try to surround themselves with a false halo of martyrdom.

Pig Iron—The market is strictly a resale affair. The outlook for 1921 is uncertain with \$40 predicted by pig iron sellers of the conservative type and \$35 by equally conservative consumers. Henry Ford is reported to have ordered intensive operation of his Imperial mine at Michigamme, Mich., where the state tax commission estimates 1,000,000 tons of developed ore. This move is interesting to the trade because it denotes the generally growing desire on the part of large consuming interests to make themselves independent of a recurrence of such vagaries as abounded in the pig iron market in 1920.

Steel—Pittsburgh advices state that the automotive industry has cancelled virtually all strip steel contracts it had on makers' books. Small cold rolled strip tonnages are moving at 5¢ and of hot-rolled at 8¢. The market, as a whole, is in abeyance.

Aluminum—Quiet prevails with values strictly nominal. Report has it that the Anaconda Copper Mining Co. is assiduously seeking a source of bauxite in the State of Washington which is interpreted as portending that powerful interest's entry into the aluminum business.

Lead—The American Smelting & Refining Co. late on Monday announced a reduction in its price of lead amounting to \$5 a ton and making the company's official quotation 7¢, both New York and East St. Louis.

Brass—Cancellations from the automotive industry are reported to have come to a halt. One independent mill has reduced some of its prices further, bringing copper sheets down to 24½¢. Deliveries of brass are now obtainable in from two to three weeks.

FINANCIAL NOTES

International Motor Truck Corp. reports net profits after charges and Federal taxes for the nine months ended Sept. 30 of \$3,114,331, equivalent after preferred dividends to \$7.99 a share earned on the \$83,108 shares of outstanding common stock of no par value. For the quarter ended Sept. 30 the net profits were \$950,910, an increase of \$239,346 over the same quarter last year. For the nine months the increase over last year is \$1,216,894.

Black & Decker Mfg. Co.—Report as of Oct. 31 shows net sales for first ten months of the year are 63 per cent in excess of the total sales for 1919. The company's business has grown very rapidly in the last two years and while keeping up its production a modern residential community has been developed for employees. The chief product of the company is portable electric drills.

Chevrolet Motor Corp. of California.—Company has been authorized to issue its entire capital stock of \$100,000 to the General Motors Corp. of Delaware, the latter to pay the California corporation \$100,000 in cash and other property. The California Chevrolet hitherto has been a separate company owned by W. C. Durant and Norman Devaux.

Hood Rubber Co. stockholders have voted to change common stock from \$100 par to shares of no par. There is \$5,000,000 common now outstanding. It is understood to be the intention of the company to declare a 100 per cent stock dividend. Last spring it paid a 66½ per cent common stock dividend.

American Bosch Magneto Co. reports it has cut overhead 17 per cent in a month to conform to the temporary condition of lower output. Sales on the Gray & Davis output are running at the annual rate of \$2,500,000 to \$3,000,000, which would mean between \$2.50 and \$3 a share for Bosch stockholders.

Templar Motors Co. has arranged with the Guardian Savings & Trust Co., Cleveland, for a \$1,000,000 issue of first mortgage 8 per cent ten year bonds, dated Oct. 1, 1920. The bonds are not to be sold, but will be held and used as collateral, if need be.

Continental Motors Corp. has decided to advance its dividend payments one month. The question of disbursing a dividend on Dec. 15 will come up for consideration by the board at the next regular meeting, Nov. 30.

Mullins Body Corp. for the nine months ended Sept. 30, reports net profits after Federal taxes of \$652,975, equivalent after preferred dividends to \$5.98 a share on the 100,000 shares of stock (no par).

Curtiss Aeroplane & Motor Corp. has reduced its capital from \$6,000,000 to \$5,436,100 (par \$100). Common stock authorized remains at 303,000 shares (no par). Stated capital, \$6,978,100.

Vulcanizing Machine & Supply Co., Jackson, Mich., has been incorporated for \$25,000 by Mark Merriman, James N. House and Herbert S. Reynolds.

INDIA TIRE SUES TEXAS

AKRON, Oct. 30—Suit has been filed in the Court of Common Pleas of Akron by the India Tire & Rubber Co. of this city against the Texas Motor Car Association, Fort Worth, Texas, to recover \$20,000 on a note given Aug. 24, according to the petition, due to mature in 60 days with interest at the rate of 7 per cent. The note, according to the papers,

is signed by W. H. Vernor, president of the Texas concern. J. M. Alderfer, president of the India, in his affidavit of attachment, declares that the defendant has conveyed and otherwise disposed of its property "to cheat and defraud its creditors and hinder and delay them in the collection of their debts."

Maibohm Motors Shows
Surplus of \$127,821

SANDUSKY, OHIO, Nov. 8—The balance sheet of the Maibohm Motors Co. as of Sept. 30 shows as follows:

Assets: Lands, buildings and machinery and equipment, etc., \$472,180; investments in miscellaneous stocks and bonds, \$11,259; cash, \$44,551; sight drafts and accounts receivable, \$298,367; merchandise inventory, \$759,458; prepaid expense, \$29,861; trade marks and good will, \$1; total, \$1,615,681.

Liabilities: Capital stock outstanding, \$1,034,550; accounts payable, \$246,242; notes and acceptances payable, \$96,305; dealers' deposits, \$32,098; accrued taxes and insurance, \$7,306; reserve for estimated federal taxes, \$41,356; other reserves, \$30,000; surplus, \$127,821; total, \$1,615,681.

In a letter to the stockholders President Maibohm states that the earnings have been very satisfactory, although the dividend for the third quarter was passed because of the general financial stringency and unsettled business conditions.

Hupp Shows Surplus
Near Five Million

NEW YORK, Nov. 8—The consolidated balance sheet of the Hupp Motor Car Co. as of Sept. 30 last shows the following:

Assets—Land, buildings, machinery, equipment, etc., \$3,223,625; Peter Smith property, not used in operations, \$550,000; cash, \$497,074; accounts receivable, \$1,764,638; inventories, \$4,745,634; Government securities, \$1,407,130; other securities, \$926,296; accrued interest, \$19,263; deferred charges, \$87,337; good will, trade names, etc., \$3,858,921; total, \$17,079,921.

Liabilities—Preferred stock, \$864,100; common stock, \$5,192,100; purchase money obligations, \$960,000; accounts payable, \$2,604,202; reserve for Federal taxes, etc., \$1,962,933; other reserves, \$795,626; surplus, \$4,700,956; total, \$17,097,917.

ALLEN GETS NEEDED FUNDS

COLUMBUS, Nov. 9—Stockholders and bank creditors of the Allen Motor Car Co. have subscribed the entire \$500,000 with which it is proposed to rehabilitate the company. Holders of 95 per cent of the claims against the company have deposited them with the creditors' committee but it is hoped to make the deposits represent all the creditors. When this is brought about steps will be taken to lift the receivership.

Bank Credits

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

NEW YORK, Nov. 11—The rising tide of commercial failures registers more promptly the slowing down of business with declining commodity prices. Reported defaults in October numbered 923, involving liabilities of \$38,914,659. In numbers the failures were the greatest since March, 1918, and in liabilities the greatest since April, 1915. Compared with failures in September, the increase in numbers was 246, in liabilities \$9,360,371.

Banking clearings for 178 cities in October totaled \$38,769,000,000, compared with \$35,991,000,000 in September and \$41,830,000,000 in October, 1919. The full effect of decreased business activity in recent weeks is not shown in the clearings figures, inasmuch as settlements for mercantile operations, as a rule, are not made until some time after the exchange of goods takes place.

The ruling call money rate in the local market continues at 9 per cent, the range last week averaging slightly higher than in the previous week. Nominal time money rates generally remain unchanged, with continued concentration of the small volume of business on short maturities.

The New York Federal Reserve Bank's statement last week showed no marked change in the bank's reserve position, perhaps the most significant change for the week being the increase of outstanding Federal Reserve notes to a new high level at \$886,708,000.

The weekly statement of the Clearing House Association, however, revealed some marked changes in actual condition, giving further evidence of the transfer of funds from this center to the interior. Loans declined \$54,255,000, and net demand deposits \$78,323,000. The item bills payable, rediscounts, etc., increased \$9,148,000 to a new record amount, \$1,315,971,000. Reserves, declining by \$15,301,880, fell below legal requirements for the third time since September, in this case, however, by only \$1,306,790.

The Federal Reserve Banks lost slightly in gold holdings last week, but gained more in other cash, total reserves increasing \$1,691,000.

SUPERIOR IN RECEIVERSHIP

NEWARK, N. J., Nov. 8—Robert H. McAdams of Elizabeth has been appointed receiver for the Superior Body Co., Inc., of Rahway, upon petition of Joseph Oxman and Thomas Armstrong, holders of 27,500 shares of its stock. The receiver has been authorized to continue the business. The company claims to have orders for 1000 automobile bodies at \$1,065 each and an order for another 100 in sight. The petition says, however, that it has not the means to meet current liabilities. The present debts are listed at \$76,000 and the assets at \$239,000.

Men of the Industry

A. G. Schonmaker has become treasurer and general manager of the Eastern Motor Sales Co., Detroit, distributor of Service trucks. He was sales manager of the Gray-Dort Co. at Chatham, Ont., and also the Canadian Chalmers factory in Windsor. He was one of the organizers of the Marvel Carburetor Co. of Flint. His last connection was with the Bakewell Motor Car Co.

B. S. Short, branch manager of the Standard Parts Co., Boston branch, has resigned his position to join the C. G. Spring Co. at Kalamazoo, Mich. Short became associated with Christian Girl in 1915 as assistant to the branch manager at Cleveland. When he received his discharge from the Army, he accepted the position as Boston branch manager of the Standard Parts Co.

T. W. Tinkham has been appointed assistant general superintendent of the Briscoe Motor Corp. Before joining Briscoe he was general superintendent of the Willys-Overland plants at Toledo. Prior to this Tinkham was associated with Olds Motor Works as general master mechanic and with Packard Motor Car Co. as assistant production manager.

Cecil B. Warner, of the Nelson Motor Truck Co., of Saginaw, Mich., has assumed the duties of general sales manager in addition to those of chief engineer, and succeeds Glenn B. Hiller. Warner designed the present line of Jumbo trucks. Allan Campbell, formerly of the Power Farming Press of St. Joseph, Mich., has been appointed assistant sales manager.

P. L. Emerson, widely known in the automobile industry, has joined the Reo Motor Car Co. sales organization. Emerson formerly was sales manager of the Olds Motor Works and resigned that position several months ago to assume the vice-presidency of the Jackson Motor Corp. He left the service of the Jackson company about a month ago.

Otto E. Utz, who for many years has been the general purchasing agent of the Pierce Arrow Motor Car Co. and up until recently, under the new management of that company, was assistant manager of purchases, has associated himself with the Nichols & Wright Motor Co. of Buffalo as vice-president and general manager.

R. W. A. Brewer, who during the war was inspector of motor apparatus for the British government and who since has been connected with the R. W. Brewer Patents Co., sails for Europe, Nov. 20, to look after European patents and expects to return to America in the course of a few months.

H. E. Westerdale, of the Westerdale Motor Sales Co., Cleveland, has taken over distribution rights in Michigan for the Gardner car, manufactured in St. Louis. Westerdale is a former Detroit automobile man and at one time was connected with Studebaker and later with the Hupp organization.

Alan R. Fernald has been appointed advertising manager of the Chrysler motor division of the Willys Corp. with headquarters at the general offices in Elizabeth, N. J. He was formerly in the advertising and sales departments of the Willys-Overland organization at Toledo.

A. D. Moore, formerly manager in Kansas City and Chicago for the branches of the Ohio Electric Car Co. and later general sales manager at the Toledo factory, has moved to Detroit to take over distribution of the Milburn Electric in the Detroit territory.

W. T. Bush has resigned as manager of the Packard Detroit branch and is succeeded by H. W. Peters, former assistant to President MacAuley as factory and later office manager. Bush announced no plans.

Reuben Kuempel has been added to the staff of engineers of the tractor bearings division of the Hyatt Roller Bearing Co., Chicago. He has been identified with the automotive industry since 1913.

C. F. Clow, Sewell Cushion Wheel Co., branch manager at Cincinnati, has been appointed assistant sales manager. C. W. Frick, formerly of the Dayton, Ohio, branch succeeds Clow at Cincinnati.

W. O. Browne has been appointed general sales manager of the Southern Motor Mfg. Ass'n. He was formerly district manager and special representative of the Bethlehem Motors Corp., Allentown, Pa.

A. G. Many has been appointed director of distribution of the Franklin Automobile Co. He was formerly assistant to the president in connection with the merchandising end of the business.

H. A. Conlon, former vice-president of the Acason Motor Truck Co., has joined the Paige Detroit Motor Car Co. as truck sales manager, to succeed C. S. Pike.

Earle E. Devlin has been appointed office sales manager of Hare's Motors, Inc., and will be in charge of all sales and specifications at headquarters.

R. T. Walsh, advertising manager of King Motor Car Co., has resigned to become advertising manager of the Apex Truck Co., Ypsilanti, Mich.

William H. Schaefer has become a member of the sales department of the Tuthill Spring Co. Schaefer will call upon the jobbing trade.

Frank Johnson, chief engineer of the Lincoln Motor Co., has resigned to rejoin the engineering department of Cadillac.

C. C. Secrist has been appointed sales manager of the Victor Mfg. & Gasket Co., Chicago.

Moore Stockholders Ask Return of Funds

DANVILLE, ILL., Nov. 8—James H. Vickers, an officer of the Moore Motor Vehicle Co. of this city, has given bond in the sum of \$5,000, following his indictment by a Federal grand jury upon the charge of using the mails to defraud. A number of other officers of the company, also indicted, have filed their bonds. C. B. Thomas, receiver for the company, has asked the court for an order to sell all the real estate, machinery and other personal property at auction, the proceeds to be divided among the stockholders.

Unless the sale brings a larger sum than is now estimated, the assets will barely pay the indebtedness and the receivership fees and expenses, leaving the stockholders little or nothing.

There is a lien of \$50,000 against the plant of the Moore company here in favor of the American Building Association, and this has first claim. Letters have been coming in from many

states of the Union, written by stockholders who are anxious to realize something out of their investment. Those who have made an investigation of the assets fear that there will be general disappointment for all who invested in the concern.

The trial of the officers has been set for the December term of the Federal court. The postoffice authorities have been compiling evidence to be used in the prosecution.

Atlanta Reserve Bank Sets 7 Per Cent Rate

ATLANTA, Nov. 8—The Federal Reserve Bank of Atlanta has announced suspension of its basic line and progressive rate for borrowing and has submitted in place a flat rate of 7 per cent. The change is now in effect.

That this revision of rates will serve to extend credits is the opinion expressed by bankers and financiers here familiar with such matters. They say that the basic lines of the individual banks marked the dividing point between sums they could borrow at 6 per cent and the sums on which progressive rates were charged. The basic lines were determined for each bank upon a basis of its average reserve balance and its investment in Federal Reserve Bank stock.

The opinion is expressed by officials of the Federal Reserve Bank that the removal of this basis line and the substitution of a flat 7 per cent rate would be welcomed by the member banks, notwithstanding that it would raise the rate on small loans. On the other hand it will greatly loosen lines of credit and lower the rate on heavy loans.

There are 450 member banks in the Sixth district which is affected by the change in policy. It does not extend beyond this district.

PETROLEUM INSTITUTE TO MEET

NEW YORK, Nov. 8—Vital problems of the oil industry will be discussed at the annual meeting of the American Petroleum Institute at Washington, Nov. 17, 18 and 19. The sessions will be held at the New Willard Hotel. The great question of supplying the country with oil and gasoline will be discussed not only from the technical and engineering viewpoints but from the business angle as well. One group meeting will be devoted to a consideration of means for promoting economy in the consumption of gasoline in automobiles.

TO KEEP DETROIT ROADS OPEN

DETROIT, Nov. 8—Roads adjacent to Detroit will be kept clear of snow this winter, permitting all season automobile and truck traffic, according to F. F. Rogers, state highway commissioner. Especial attention will be given the roads leading from Detroit to Toledo, Flint and Mt. Clemens. The State will pay 60 per cent of the cost and the counties the remainder. Commissioner Rogers said today full co-operation of the counties interested had been promised.

Calendar

SHOWS

- Nov. 14-21—New York, Automobile Salon, Commodore Hotel Ballroom.
- Nov. 15-20—Chicago, Automotive Equipment Show, Coliseum, Automotive Equipment Association.
- Dec. 10-18—New York, Motor Boat Show, Grand Central Palace.
- Jan. 3-8—New York, Motor Truck Show, Motor Truck Ass'n of America, Twelfth Regiment Armory.
- Jan. 8-15—New York, National Passenger Car Show, Grand Central Palace, Auspices of N.A.C.C.
- Jan. 17-23—Milwaukee, Annual Automobile Show, Milwaukee Automotive Dealers' Ass'n.
- Jan. 22-27—San Francisco, Second Annual Pacific Coast Automotive Equipment Exposition, Auditorium.
- Jan. 22-29—Cleveland, Annual Passenger Car Show, Cleveland Mfr's & Dealers' Ass'n, Wigmore Coliseum.
- Jan. 22-29—Montreal, Annual Automobile Show, Montreal Automobile Trade Ass'n, Motordrome Bldg.
- Jan. 29-Feb. 4—Chicago, National Passenger Car Show, Coliseum, Auspices of N.A.C.C.
- Feb. 5-12—Minneapolis, Annual Automobile Show, Minneapolis Automobile Trade Ass'n.
- Feb. 6-12—Columbus, National Tractor Show, Columbus Tractor & Implement Club, Ohio State Fair Grounds.
- Feb. 12-19—Kansas City, Annual Automobile Show, Kansas City Motor Car Dealers' Ass'n.

- Mar. 2-11—Des Moines, Annual Automobile Show, Coliseum, C. G. Van Vliet, Mgr.
- Mar. 12-19—Boston, Annual Automobile Show, Mechanics Bldg. and South Armory.

FOREIGN SHOWS

- Nov. 29-Dec. 4—London, Cycle and Motorcycle Show, Cycle and Motorcycle Mfr's and Traders Union, Ltd., Olympia.
- Jan. 7—Sydney, Australian Motor Show.
- Jan. 22-29—Colombo, Ceylon Motor Show.
- Feb. 7—Delhi, India, Delhi Motor Show.

CONVENTIONS

- Nov. 30-Dec. 3—St. Louis, Third Annual Meeting and Exhibition, Automobile Accessories Branch, National Hardware Ass'n.

- Dec. 7-10—New York, Annual meeting American Society of Mechanical Engineers, Engineering Societies Building.

- Dec. 8-9—Cincinnati, Annual Convention, Ohio Automobile Jobbers' Association.

- Dec. 13—Washington, Convention of American Association of State Highway Officials.

- Dec. 28-30—Chicago, Annual Meeting American Society of Agricultural Engineers.

- Jan. 11-12—S. A. E. Annual Meeting, New York City.

- Feb. 2-4—Chicago, First Annual Meeting, Automotive Electric Service Assn. Hotel La Salle.

RACES AND TOURS

- Nov. 25—Los Angeles, Thanksgiving Day Speedway Classic, Beverly Hills Speedway.

Mechanical Engineers Form New Sections

NEW YORK, Nov. 5—Four hundred members of the American Society of Mechanical Engineers have organized a professional section on materials handling and will provide primarily a common channel of intercourse between all the technical and industrial organizations co-operating in the solution of engineering problems connected with the handling and distribution of materials and products.

This section will aim to be a bureau of information—complete in its scope, specific in its knowledge of the physical and economic conditions, and unbiased in its conclusions. This will be done by having special meetings on particular subjects, meetings jointly with other sections, other organizations or associations, by taking part in all local and national problems relating to the purpose of this section.

Members of the society interested in aeronautics have organized a professional section on this subject. Howard E. Coffin, Jesse G. Vincent, Orville Wright, C. F. Kettering, Elmer A. Sperry, James Hartness, John R. Cautley, Lionel S. Marks, Miller R. Hutchison, Charles E. Lucke and Joseph A. Steinmetz, all prominent in the aeronautic field in the war, are among those who have registered in the section.

Transportation will be the keynote of the annual meeting of the American Society of Mechanical Engineers which will be held in this city Dec. 7 to 10. The subject will be discussed by experts in all lines of transportation, including railways, waterways, motor trucks, feeders.

TRUCK SALES HEADS TO MEET

DETROIT, Nov. 6—The National Association of Motor Truck Sales Managers will hold its annual meeting at the Hotel Statler, Detroit, Nov. 18 and 19. The business meeting will be held on Thursday, Nov. 18, in the morning and an open

meeting starting at 2 p. m. will be devoted to the following three topics:

- 1—Good business principles as applied to motor truck industry.
- 2—Railroads as a market for motor trucks.
- 3—Work of the National Automobile Dealers Association.

At 7 p. m. the annual dinner will be held. On Friday, Nov. 19, at 10 a. m., there will be a discussion of potential markets and at 2 p. m. on salesmanship.

Extend Work Period in Automotive Course

CLEVELAND, Nov. 5—Acting on information obtained by the Automotive Association of the Chamber of Commerce, the Michigan State Automobile School of Detroit has announced that its previous course of six weeks' theoretical instruction and six weeks' practical instruction has been changed to three weeks' theoretical instruction and nine weeks' practical instruction.

Each day of the theoretical instruction period will be divided so that every alternate two hours will be in the shop. The practical instruction will cover the balance of the course of nine weeks and each day will be nine hours in length, to accustom students to shop hours.

"It is the belief of the automotive association that more practical instruction should be given in automotive schools throughout the country, largely interspersed with theoretical instruction," says Secretary Brown of the automotive association. "The Michigan school is the first to adopt our views."

THORSBY UNDER CHARGES

NEW HAVEN, CONN., Nov. 8—E. Raymond Thorsby, former secretary and works manager of the Kelley Tire & Rubber Co., Inc., of this city, has been held under \$2,500 bond on the charge of stealing \$6,000 worth of cord fabric from the company's plant. He recently brought suit against the company for \$50,000 damages for breach of contract.

Motor Boat Meeting of S. A. E. in December

NEW YORK, Nov. 8—The annual motor boat meeting of the Society of Automotive Engineers will be held Tuesday evening, Dec. 14, at the Automobile Club of America in this city, during the week of the national motor boat show. The technical session will be preceded by an informal dinner at which C. A. Criqui will act as toastmaster. The dinner speakers will be prominent members of the motor boat industry.

The technical session will be devoted to the discussion of recent design advances in internal-combustion motor boat engines and the probable trend of their further development. Both the Otto and the Diesel cycles will be treated from the standpoint of economy, weight, accessibility and durability.

The Metropolitan and Pennsylvania sections of the society plan to join in this meeting, which will replace their monthly meeting for December. A trip of inspection through the plant of one of the representative boat and engine manufacturers near New York City has been planned for the afternoon.

FIAT WINS ECONOMY TEST

NEW YORK, Nov. 5—In the recent fuel consumption trials held at Basle, Switzerland, one of the new Fiat models carried four passengers 97 miles at the rate of 8.85 litres per hundred kilometers, according to reports reaching here. The competitors, about 40 in number, with cars of French, Swiss, Italian, American and English construction were divided into teams and the awards were based on the lowest consumption of the team. The best team average was 6.35 litres per ton and for 100 kilometers, and the most economical car in this team was a four-cylinder Fiat of 65 x 110 m.m. bore and stroke. One of the features of the competition was a wide difference in the amount of fuel consumed by cars of approximately the same size.

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Germany Soon to Be Bidding for Export Trade

Leader of Central Powers is still suffering from war shock in automotive production and use, but is rapidly pulling together the facilities and trade wisdom that once made it a world-wide sharp competitor.

By W. F. Bradley

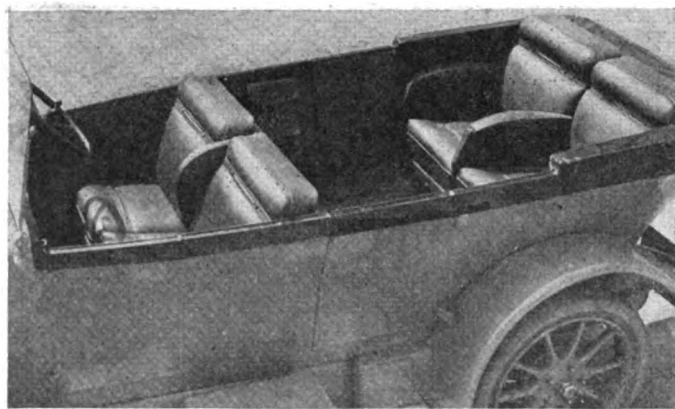
COMPARED with Paris, London or Brussels, the first impression received in Berlin is that the use of automobiles has ceased. This impression is increased by a more extended tour through Germany. During a period of two weeks spent in that country, when every important town was visited, only two automobile touring parties were observed: one of these was Italian and the other Swiss, and they appeared to have just come over the frontier into the remote corner of Bavaria in which they were found.

In the big cities a limited number of taxicabs are in service, but in practically every case they are outnumbered by old horse cabs. In Berlin the only automobiles in use appear to be owned by members of the Allied Missions. In the frontier towns of Cologne, Coblenz and Mayence there is a certain amount of automobile traffic, but examination shows that this is practically all confined to civil or military members of the varied Allied Missions. In the big provincial cities, such as Munich and Leipzig, it can be declared that the use of private automobiles is practically unknown.

Germany has placed an embargo on the use of passenger-carrying automobiles, but gives special permits in individual cases. Undoubtedly, by the time

these lines appear in print, this restriction will have been removed, but it is doubtful if this will cause any increase in automobile traffic. The high initial cost of automobiles, the 15 per cent luxury tax on their purchase price, the heavy State taxes, the scarcity and the cost of gasoline and tires are in themselves sufficient to restrict the automobile movement without any Government decree.

Gasoline is officially sold at 4 marks 50 per litre, or at nominal rates of exchange \$4.25 per gallon. It is impossible, however, to obtain it at this price, and even when a higher price is paid, it is only obtained with difficulty. Few German automobiles can be bought at less than 200,000 marks, or nominally \$50,000—the pre-war value of the mark was 23.8 cents. Benz lists their smallest car, an 8 hp. four cylinder, at 62,308 marks for the chassis without tires. With a 6-passenger body, electric lighting and starting, speedometer and tires, the list price of this car becomes 139,124 marks. An 18 hp. four-cylinder car with open touring body, Bosch electric lighting and starting, tires and demountable rims, is listed at 200,000 marks. Nominally this is equivalent to \$50,000, at which price it would, of course, be unsalable abroad. At the rate of exchange at this writing the price is only \$3,000. These two examples are given as



Close up view of disappearing top on N. A. G. automobile

an indication only of prevailing prices, and in order to show the difficulty Germany has to do business on her home market.

According to the latest Continental Tire Co.'s price list, a set of four tires 34 x 4½, cost 13,800 marks, or practically \$3,450 at normal exchange. The following are the list prices of the most commonly employed dimensions, and to these a 15 per cent increase must be added:

	Casings.	Tubes.
710 x 90	1535 Mks.	170 Mks.
815 x 105	2282 "	240 "
820 x 120	2531 "	275 "
895 x 135	3165 "	322 "
895 x 150	3741 "	365 "

The truck industry is seriously handicapped by high purchasing and operating costs. Compared with America or such European countries as France and England, the number of trucks in service is very small. They are practically all army type 3 and 5-tonners, the latter nearly always being used with a trailer. Trucks are used for local haulage only, the long distance services which are common in France and England appear to be unknown in Germany. Numbers of the trucks in use in Germany are obviously army vehicles and are being run with the steel types imposed by war conditions. Berlin has a small number of motor bus lines, the vehicles used being either Daimler or N. A. G. lightened 3-ton chassis, carrying double deck bodies. There is no use whatsoever in Germany of trucks with giant tires.

Generally throughout Germany the taxicab business is in the hands of men who own their own cabs, the vehicles thus being of the most diversified makes and types. There appears to be no specialized taxicab chassis, such as constitutes a feature of London and Paris. Electricity being comparatively cheap, electric taxicabs are employed, particularly in Berlin. All these are vehicles built before the war. The use was noted in Berlin of a diminutive single-seater electric for city work only. This is a very small and light four-wheeler, just capable of carrying one person and maintaining a speed of about 12 miles an hour on good city streets. It is manufactured by the Der Kleine Elektrische Wagen Co. of Berlin.

Another unusual type of vehicle, used rather more for business than for pleasure, is a three-wheeler with twin or four-cylinder air-cooled engine driving to the front wheel. There are two principal makes on the market, the Phanomobil and the Cyklonette. Their essential features are the same: a twin or four-cylinder motorcycle type of air-cooled engine mounted above the front wheel and driving this latter by means of a chain. The power

plant steers with the wheel by means of tiller control. The whole of the mechanism is exposed.

Automobile imports into Germany are forbidden, thus the only foreign cars to be found are those of pre-war importation. They are mostly French, with a sprinkling of Fords. The cars of the Allied Missions can only be looked upon as temporary importation.

German exports are allowed under license from the Government. Each individual export must be submitted to a departmental office, which has the right to refuse the permit if the conditions and price are not satisfactory. The factories are working almost exclusively on export business, and this is being done in practically all cases at present rates of exchange. It is only because of the low value of the mark that Germany can sell her automobiles abroad.

The reports that Germany insists on pre-war rates of exchange are not correct, at any rate so far as the automobile industry is concerned. At the time this inquiry was made the value of the mark had improved on most foreign markets, having risen to about 1½ cents in American currency, and already manufacturers were beginning to complain that it was difficult to compete abroad. With the high value, in marks, of an automobile, only a slight improvement in the rate of exchange tended to upset foreign values and make business difficult.

Technically there is little that is new in the German automobile industry. In practically every case the cars now being produced are duplicates of those built in 1914, with the addition of electric lighting and starting. Before the war Bosch had perfected his lighting and starting sets and every German manufacturer is now making use of these, but they have not been incorporated in the original design and even now are only put on as an extra.

The explanation of this apparent stagnation in design, compared with the important changes made in other countries is that after the defeat a wave of pessimism swept over Germany, and this alone was sufficient to prevent engineers getting out anything new. Further, with general conditions so unsettled, the home market difficult and much of the foreign market gone, there was no incentive to produce anything new.

It was necessary, too, to find employment for the workers, for the law forbade the factories to dismiss the regular hands except under certain well-defined conditions, and this law could only be complied with by going ahead on old designs.

The claim is made that engines are much more efficient than before the war, but it is admitted that design is old-fashioned and that the new models, on which the experimental departments are now working, will not be in production for a couple of years. No indications are forthcoming as to what these new models will comprise, and very close secrecy seems to be guarded over their features.

Real progress seems to have been made in the matter of fuel economy, and this is not surprising when the full facts are learned regarding the hardships the Allied blockade inflicted on industrial Germany. Compelled to economize in every possible way, the fuel question was studied most closely.

To give one particular example, the Benz engineers claim that with their six-passenger four-cylinder touring car, measuring 2.9 by 4.7 in. bore and stroke, the gas consumption is guaranteed to be equal to 34 miles per gallon on the open road, and

27 miles per gallon for city work. While the engine is small, the car is full sized for the stipulated number of passengers, and the construction is on the usual substantial German lines.

No opportunity was given of verifying these figures, but from conversation with owners who have had this and similar types of cars in service the claim does not appear to be exaggerated.

The average German car at the present time has four cylinders with fixed L head.

It has high-tension magneto ignition, forced or circulating oil system, cooling by means of pump, and is mounted on a subframe.

The gearbox contains four speeds and reverse, and is entirely separate from the engine.

Generally the drive shaft is enclosed, a single universal joint is used, the rear springs are shackled at both ends, and central drive is adopted.

The gas tank is at the rear and gasoline is brought to the carburetor by means of exhaust pressure.

Not a single engine was found with a detachable head; there are no 8 or 12-cylinder engines; there were very few cases indeed of unit power plant; lighting and starting sets were not built in with the engines; battery ignition is not used and will have a hard fight to gain admission in the home of Bosch; spiral bevel gears are being experimented with and, although not employed, it was admitted they will be used very shortly.

There are very few cars with Hotchkiss drive and none with front wheel brakes.

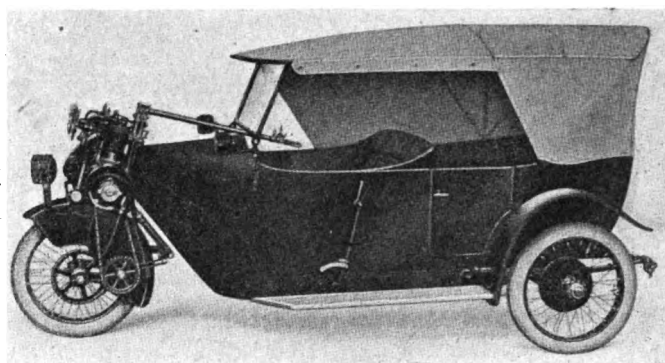
Clincher tires are used exclusively and are generally mounted on detachable rims.

There are no metal disk wheels, and although detachable wire wheels can be supplied, they never form a part of the standard equipment.

Removable cast steel wheels of the spoke variety have made their appearance and doubtless will be used very extensively in the future.

The only really important case of an overhead valve engine is a Mercedes which was in production before the war, and is being continued with the addition of a cover over the valve mechanism. This is a high-class job with overhead camshaft and is very similar in its general design to the aviation engines Mercedes produced during the war. The vacuum feed system is not yet employed in Germany, and possibly will not be adopted to any great extent, the preference apparently being for gravity feed for small cars and for air or exhaust pressure with the tank at the rear for medium and large cars.

The outstanding feature of German construction at the present time is to be found in the body lines. Every manufacturer appears to have decided on one particular type of touring body which is so distinctly Teutonic that it might be imagined there had been concerted action to advertise the origin of the car wherever it went. In whatever country of the world it were found, even the most uninitiated would recognize the modern German automobile as a product of the Fatherland.



Phanomobil 3-wheeler

The radiator is generally pointed, the sides of the hood are straight and the top rounded, the windscreen is hinged at the bottom, the body has high, flared sides, or with a much greater width at the top than at the bottom, and the top is invariably concealed in the body.

Frequently the rear of the car is brought to a point and has a certain resemblance to the bow of a yacht.

This type of body, built rather narrow on the chassis line, necessitates placing the brake lever, and frequently the change speed lever, on the outside, a practice which does not appear to be distasteful to German motorists.

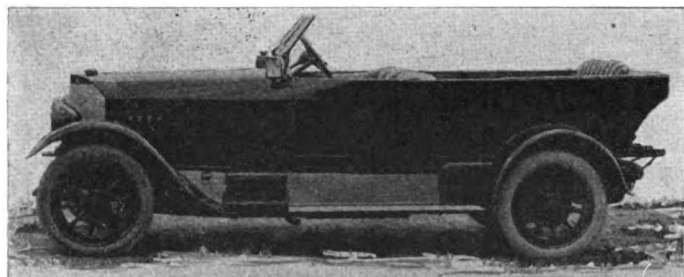
Very frequently the body is painted in two colors, a light color being used for the sides, up to the point where the hood begins to round off, and a dark color for everything above this line. This provides a straight line from radiator to rear, and gives to the car a somewhat nautical appearance, particularly if there is a deck just back of the front seats and if the stern is brought to a point.

While the general lines may not meet with the taste of motorists all over the world, there is no doubt that the German practice of building a housing for the hood in the body is excellent. In practically all European countries 75 per cent of the driving is done with the hood down, and the German method of dropping it into a recess where it is completely hidden and protected is preferable to the more common practice elsewhere of hiding it with a slip cover.

There are two distinct types of housing for the top. In one a well is formed and the top of this is covered either with a hinged wood panel or with a leather cover permanently attached along one edge and secured with push buttons along the other edge. The disadvantage of this is that if water gets in the well it cannot be got out again very easily.

With another design a ledge is formed to receive the top, and the whole is hidden by a leather housing composed of a horizontal and a vertical surface, which forms a continuous line with the rest of the body. In this case water can get away readily and if the cover is left off the top has a chance to dry. With the German color scheme comprising a black or dark band from front to rear, the leather cover merges in with rest of body.

Having been seriously handicapped by the shortage of leather during the war, Germany has developed artificial

*Mercedes touring car*

leathers and is using these even on high-grade cars with very good effect. Very many of the fancy leathers prove on examination to be only imitations. The upholstery, with its sharp angles and its divisions between seats, looks hard and harsh. Even in the case of big cars it is customary to divide the rear seat into two places and to accommodate the fifth and sixth passengers on folding seats.

Germany is not paying attention to the really cheap car as it is known in America. The buying ability of the people is low and the home market is too small to allow her to get into production on a really big basis, and she does not seem to entertain any hope of competing with America on the foreign field in the cheap car class.

The cheapest class car she will build will be 4, 5 or 6-passenger model with four cylinders of about 70 mm. bore. This will meet the home requirements, where maintenance costs figure very prominently and will also be saleable on many of the foreign markets.

The greatest export business, however, will be done with a four or a six-cylinder model of nominally 18 hp. Cars of this type are already being shipped to the Scandinavian countries, and undoubtedly an important effort will be made to get on the South American markets.

Competition will not be in the cheap car class, but in the medium and high class field. Germany at the present time is not really dangerous, for she is laboring under considerable difficulties.

There is no doubt, however, that she will come back strongly, and that within two or three years' time she will have to be seriously reckoned with on the world's automobile market. Manufacturers realize that for the present trade with France will be difficult and that with England, America and Belgium will be limited. In the Scandinavian countries, in Spain and Portugal, there is no prejudice against German automobiles. The South American market has to be recaptured and the Far East is being looked upon as an outlet.

During the war Germany had no need of developing the use of army automobiles on the same scale as the Allies. With no tires and very little gasoline, the railroad had to be used in preference to the high road for the transportation of supplies and troops, and only the highest officers were given passenger cars. Under the peace conditions large quantities of automobile trucks had to be handed over to the Allies.

During the period of the great retreat and the revolution the utmost

disorder prevailed. While the typewriter girls took their machines home with them, and soldiers appropriated their arms and pilfered stores, officers took possession of army automobiles and sold them to unscrupulous dealers. Later the Government stepped in and put up for sale what remained of the army automobiles, so that Germany never had to face the disposal of big stocks such as were found in France and England.

Practically all the German automobiles got into the hands of dealers, who rebuilt them, fitted them with tires, which were drained from France and England, built new bodies and sold them in the Scandinavian countries. Many of these cars could be passed off as new, and prices for a time ran as high as 240,000 marks for an open touring car.

Among the sales were a certain number of French, English or American captured vehicles, which were also put into shape and sold. Frequently the owners of these are unable to get spare parts, for on account of the doubtful origin of the vehicles, the authorized dealers refuse to supply. This period, which lasted for 18 months after the armistice, was a wonderful harvest for the dealers in Germany and surrounding countries.

The mark stood exceedingly low, army cars could be bought very cheaply, and the Scandinavian countries, having been starved of automobiles for four years, made ready purchases. The bottom has now dropped out of this business, to the great regret of those who were in the deal.

Enormous capital increases have been made by all the German automobile companies. This has been made use of in many of the Allied countries in order to prove that Germany is preparing to become a serious contestant on the world's market. Much of this increase is due to the depreciation of the mark and the enormously increased cost of raw materials. Labor, too, is very much more costly than before the war.

Whereas in 1914 a skilled worker rarely earned one mark an hour, wages now vary from four marks in Bavaria to 6 or 7 marks in Stuttgart and Mannheim. There are in Germany about 100 automobile manufacturers, but only 20 of these are of real importance, the others either assembling a car on a small scale or running an automobile factory as a section of bigger works.

It is estimated that the aggregate capital invested in the German automobile industry is 400 million marks, as compared with 120 to 150 millions in 1914. The maximum output of the factories may be estimated at 30,000 automobiles of all kinds per annum.



Horch 5-ton truck with trailer. The use of trailers is common in Germany. The enclosed driver's cab and cast steel wheels are distinctive features

Novelties Are Prominent at the Automobile Salon

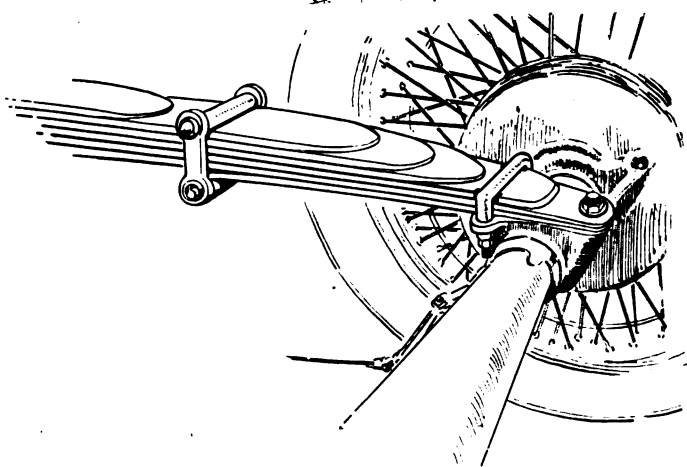
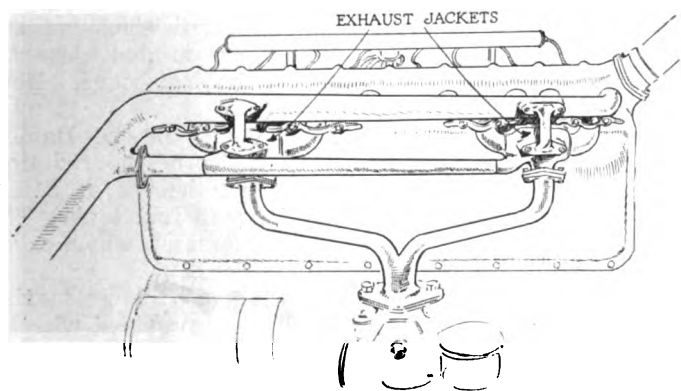
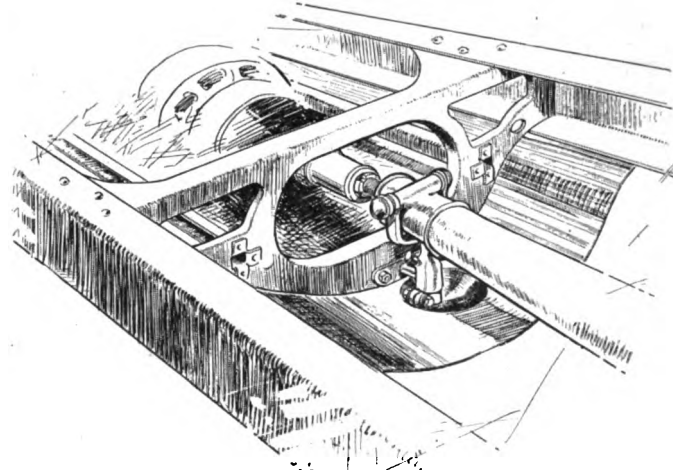
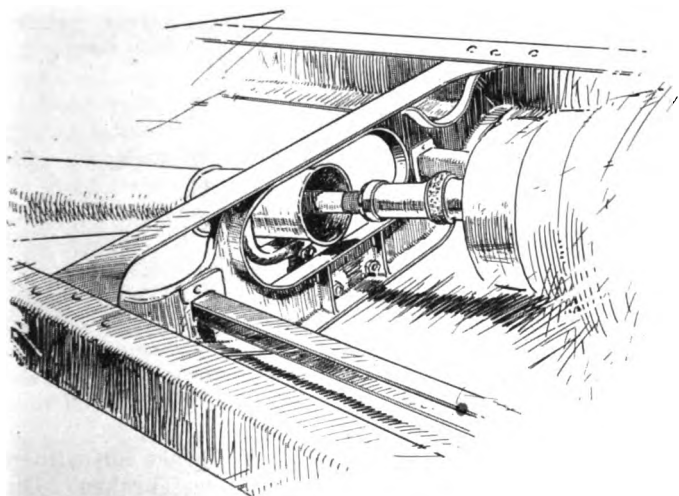
Twenty cars were shown at the Salon this year, equally divided between foreign and domestic products. Much interest was aroused by the new coachwork exhibited by the custom builders. The Minerva, shown for first time since 1913, has new features. Duesenberg only new car.

THE Automobile Salon, which started as an exhibition of imported cars and, during the war, when the importation of automobiles was practically at a standstill, assumed the character of a show of high grade domestic cars and coachwork with a light sprinkling of foreign products, appears now to be in a good way to become definitely an international show of quality automobiles rather than a show of foreign cars only. Out of twenty cars shown at the Hotel Commodore this year, ten are American and ten foreign, with the prospect of one more American car being added in the course of the week. Custom built automobile bodies (on chassis) are being exhibited by nine firms, all American.

Of the ten American makes on view at the opening, only one, the Duesenberg, is entirely new, and this is fully described elsewhere in this issue. Another new American make, the Collins, was scheduled in the list of

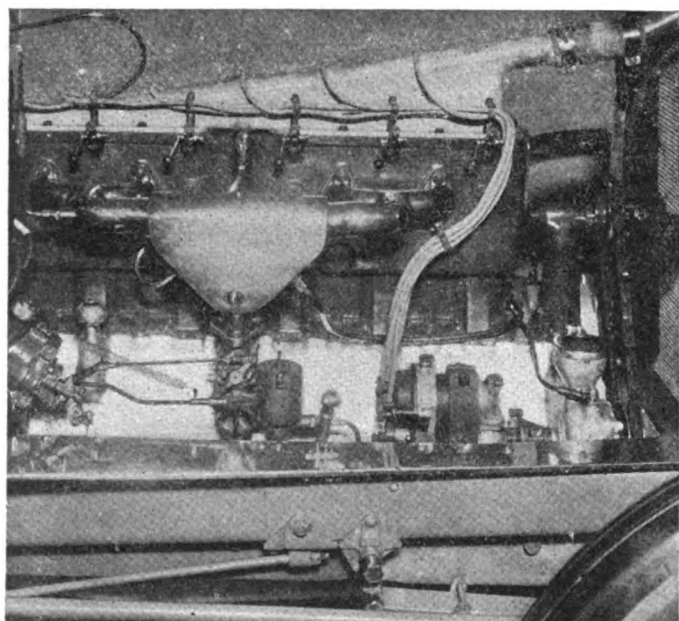
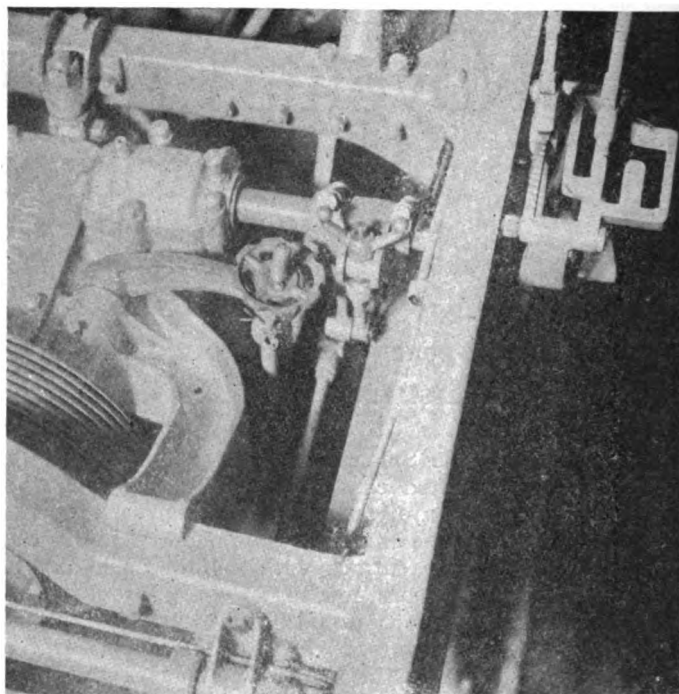
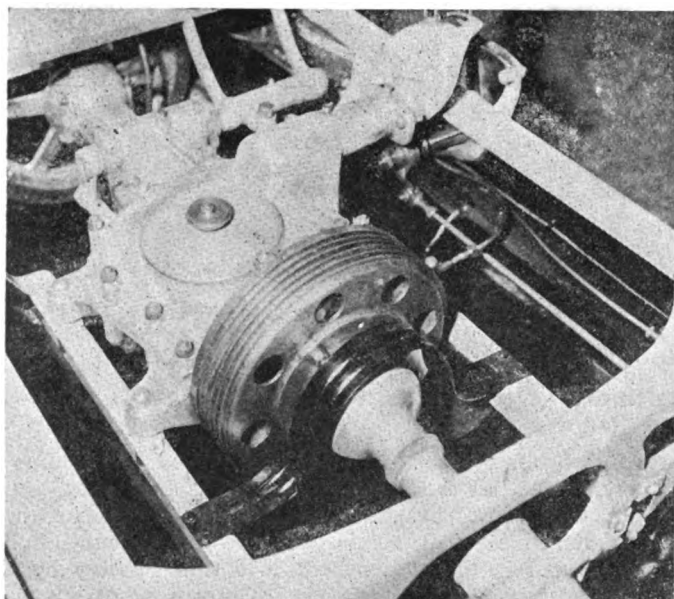
exhibitors, but the car had not yet arrived at the time of the writer's visit to the Show.

Of the foreign cars, the Minerva has not been seen at the Salon since 1913. This is a car with a four-cylinder engine, and is to be imported into this country by the Brooks-Ostruk Co., New York. The engine has a bore of 90 and a stroke of 140 mm., and the cylinders are now cast in block, with all of the cylinder heads in a single casting instead of separate. The new Minerva is equipped with the S. E. V. starting and lighting system. The radiator design has been changed, and one of the objects in view in adopting the block construction of engine was to insure that the cooling water temperature will be more uniform throughout the jacket. As customary in Continental cars, the transmission gear is mounted separately, and the top half of the aluminum case is removable, thus permitting of replacing any bearing in the case in four

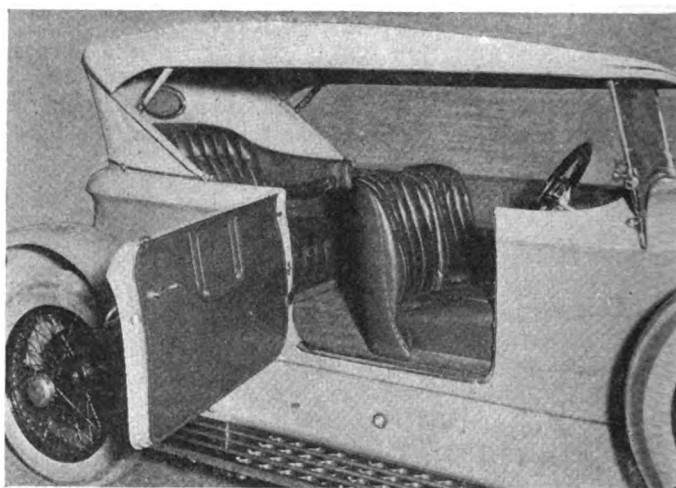


Above—Torque tube frame crossmember on the Minerva. Below—Details of exhaust manifolds on Duesenberg engine

Above—Forward support of torque tube on the Minerva. Below—Minerva spring



Above—Minerva transmission. Below—Sunbeam engine



Above—Sunbeam brake adjusting means. Below—Brooks-Ostruk body on Delage chassis, showing runningboard

hours' time. There is a very deep cross member at the middle of the frame, the lower edge of which conforms to the shape of the mudpan. This cross member is pressed with an opening through which the propeller shaft passes. The propeller shaft is inclosed in a tube, in which it has a certain amount of freedom, there being no bearing on the propeller shaft at the forward end of the torque tube. The tube is supported at its forward end by a forked link, pivoted to the lower part of the frame cross member.

There are also some novel features in the rear spring construction, which is of the cantilever type. The main leaf or master leaf of the spring is only about one-fourth as long as the complete spring, and together with the second and third leaves is secured underneath the rear axle housing by means of suitable spring pads.

The Sunbeam car is exhibited practically in the same form as it was shown at Olympia last winter. Rudge-Whitworth wire wheels are now standard equipment. The Sunbeam employs a two jet carbureter, each jet supplying the three cylinders of one block. In this way a better distribution is claimed to be obtained. One feature of

considerable interest on this car is the brake adjustment for both the transmission and the wheel brakes. One brake is adjusted by means of a finger wheel, and the other by means of a horizontal bar with knobs at the ends. The two adjusting devices are located close together, underneath a trap-door in the foot-board. Both are self-locking.

There have been only minor changes in the Daniels eight, including an increase in the size of the radiator, which is of the honeycomb type, and the use of a different form of suspension for the rear fuel tank. The capacity of this tank was somewhat increased, which called for a more secure method of suspension.

The features of the Daniels stand is a new marine roadster, a four-passenger car. This is provided with an aluminum body, having a mahogany deck running all around. The front seats are divided, and there is plenty of leg room in the rear. The lights are carried out in imitation of ship's funnels, and there are two ventilators on the sides of the cowl and one on top. Upholstery is

(Continued on page 1033)

Duesenberg Car Has "Straight Eight" Engine and Four Wheel Brakes

In the powerplant of this interesting new vehicle many of the Duesenberg racing features have been adapted to passenger car practice. Hydraulic system of actuation of brakes replaces the Perrot, which has been a feature of all French systems. Unsprung weight reduced.

By P. M. Heldt

ONE of the interesting new cars exhibited at the Salon this week is the Duesenberg "straight eight," which has been developed by the Duesenberg brothers and in which a four wheel braking system is featured. Fred Duesenberg, with his engineering staff, has been working on the design of this car practically since the signing of the Armistice. Many of the features are similar to those of the post-war Duesenberg racing machines, notably the use of an eight cylinder-in-line engine. The successes achieved by these racing machines the past year are well known to our readers.

In the design of the new chassis, it has been Duesenberg's aim to produce a car that should embody the most up-to-date features in automobile engineering; a car that, while having all the liveliness and speed that the fastidious owner demands, would yet be economical to operate. Fuel economy has been achieved by the use of an engine of moderate cylinder displacement (260 cu. in.) and capable of running at very high speed, and tire economy by the use of cord tires of liberal size and the reduction of all unsprung weight to a minimum to eliminate bouncing of the wheels and consequent slipping and wear of the tires.

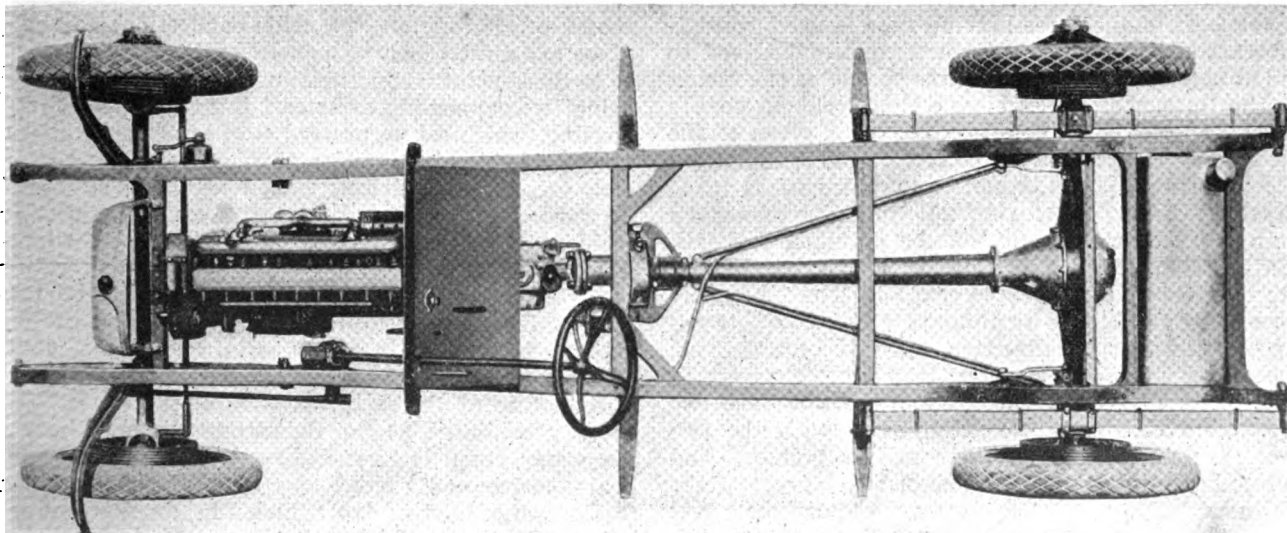
The engine has a bore of $2\frac{7}{8}$ in. and a stroke of 5 in. All eight cylinders and the top part of the crankcase are cast in a single block, the cylinder head being a separate iron casting and the lower half of the crankcase an aluminum casting. In the engine shown at the Salon, the well-known Duesenberg arrangement of valves is used, the inlet and exhaust valve being arranged in the cylinder head horizontally and operated by means of rocker levers

extending up the sides of the cylinders. However, owing to the very satisfactory results obtained with the racing engines which have inclined valves in the head, operated from an overhead camshaft, it has been decided to adopt this construction, and this feature will be introduced in the next lot of engines to be built. This change in the design also will make it possible to completely machine the compression chambers, the advantage of which is that it permits of making all eight compression chambers of exactly equal volume, which tends to promote smooth running, and to prevent the adherence of carbon deposits to the combustion chamber walls. While in the racing engine two exhaust valves and one inlet valve are used per cylinder, the passenger car engine will have only a single inlet and a single exhaust valve.

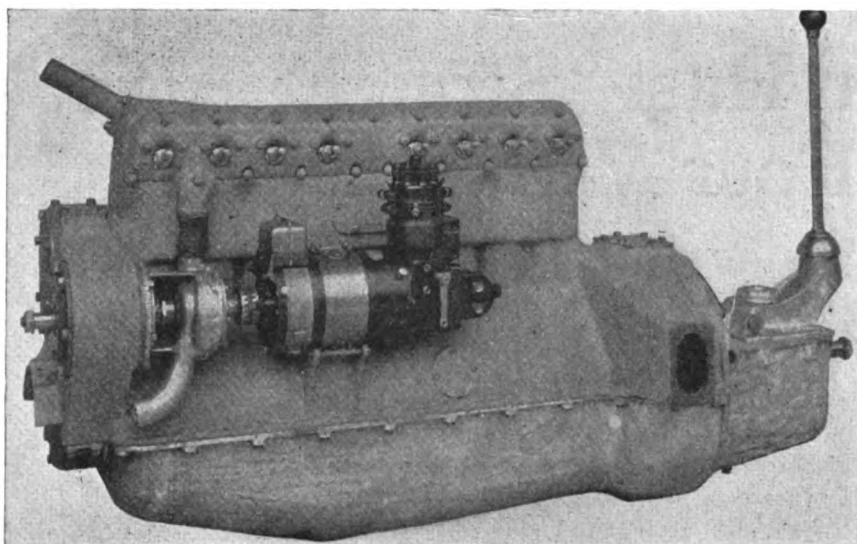
The exhaust valves are made of cobalt-chrome steel, and the inlet valves of low percentage tungsten steel. Double springs are used on both sets of valves, as has become customary for high speed overhead valve engines. The compression chambers are so designed as to give a full load compression of 80 lb. per sq. in.

Most of the racing successes of Duesenberg cars have been achieved with the aid of magnalite pistons, and Duesenberg still favors aluminum alloy pistons, but in view of a certain amount of prejudice against them, due to the fact that some prominent manufacturers have given up their use, he will furnish either aluminum or cast iron pistons, as desired by the customer.

Piston and connecting rod are held as light as possible, in order to reduce the inertia forces and the stresses re-



Chassis of Duesenberg car



Unit powerplant of Duesenberg, from generator side

sulting therefrom. The pistons are of thin walled design, and the piston head is connected to the skirt by means of four radial ribs, which serve both to support the piston head and to help transmit the heat absorbed by the head to the skirt. Each piston carries only two compression rings, in grooves above the piston bosses, it having been found that two rings, when well fitted, insure substantially as good a compression as three, and, of course, they save considerable weight. There is a circumferential oil groove cut into the skirt of the piston over the end of the piston bosses. The combined weight of a piston, piston pin, rings, connecting rod cap and bolts is between 32 and 34 oz.

The piston pin has its bearings in the piston bosses, and is clamped in the upper end of the connecting rod by means of a clamping screw which passes through a shallow groove on the piston pin, which prevents it from drifting. The connecting rods are made of chrome nickel steel (the same material as was used for the rods of the Liberty aircraft engine) and are of the tubular type. The caps are held on by two cap screws with castellated nuts and cotter pins. The crankpin bearing bushings are soldered into the connecting rod head and cap, in order to obtain the best possible heat conductivity between bushing and rod. To promote the dispersal of heat from the outside of the connecting rod big end, the latter is turned with cooling flanges or ribs.

A crankshaft of the three-bearing type is used, consisting substantially of two four-throw cranks joined end to end and at right angles. While not as speedy as the racing engine, the Duesenberg stock engine is of decidedly speedy design, and special care therefore had to be given to the design of the crankshaft with a view to eliminating periodic vibration. To this end the crankshaft is made comparatively heavy, measuring $2\frac{3}{8}$ in. in diameter on the main journals and $2\frac{1}{2}$ in. on the crankpin journals. Besides, the crankshaft is provided with balance weights, so as to eliminate all unbalanced couples. The four short crankarms are provided with integral counterweights extending in the opposite direction from the crank axis, while what correspond to the four long crankarms are in the form of circular disks, and in addition there are two counterweights which are forged integral with the two halves of the crankshaft at their middle points. End thrust is taken up on the central main bearing.

In the new design of engine, the overhead camshaft will be driven through a vertical shaft at the forward end, with helical gears at top and bottom, the vertical shaft

running at crankshaft speed. This construction is similar to that employed in the racing engine, except that the latter has straight bevel gears and that both members of the upper set of bevel gears will be mounted in the cylinder head, instead of the driven member in the head and the driving member in the valve gear drive housing. Thus, when the cylinder head is removed, the two upper bevel gears come right with it, the driving gear slipping over the top end of the vertical shaft, which has one flat on it. This makes it impossible, in taking the engine apart and reassembling it, to get the valve drive together wrong.

As already stated, the entire valve drive at the front end of the engine is encased in an aluminum housing. A drive for the generator is taken off from the vertical shaft at about mid-height by means of a pair of helical gears, and a drive for the combined water pump and oil pump is taken off the crankshaft pinion by means of an extra bevel gear, mounted on a horizontal shaft.

Lubrication of the engine is entirely by the pressure system, the gear type of oil pump being located at the forward end of the engine, as just explained. The oil is forced through a passage machined in the housing of the pump into a main distributor pipe extending the length of the crankcase, and through radial passages from same to the three main bearings. At the main bearings the oil passes into the drilled crankshaft, and so reaches the crankpin bearings. Each of the four crank disks is turned with an oil groove on its circumference, which is closed by means of a steel ring pressed over it, an oil-tight joint being secured by tinning. These oil grooves are always full of oil, owing to the centrifugal force, and this obviates trouble from unequal lubrication of the different crankpin bearings.

The entire electric system, including the ignition unit, the generator and the starter, is of Delco make. In the racing job the distributor was driven by a pair of helical gears off the center of the camshaft. On the new design the distributor will be mounted on the generator, the same as on present design. There is a bracket mounting for the generator at the side of the engine, which is driven from the camshaft drive at the forward end, as already described, and the starter is mounted on the flywheel housing in the usual manner. With the ignition unit at the center of the engine, the cable connections to the spark plugs are most nearly of equal length.

A three-point support is used for the engine, there being two supporting arms cast integral with the flywheel housing, which set on pressed steel brackets riveted to the frame side members, and a third support at the forward end. A semi-cylindrical, ribbed flange is cast onto the forward end of the crankcase, with which engages, on the inside, a similar flange of a pressed steel supporting bracket, which rests on top of the frame front cross member. A couple of bolts unite the two semi-cylindrical flanges, these passing through oblong holes in the pressed steel member so as to give a certain amount of flexibility to the support.

A feature of the cooling system of the engine fitted to the car exhibited at the Salon deserves mention. Here the water pump is located directly back of the camshaft gear housing and a short hose connection joins its outlet to the water inlet of the cylinder head. The water here enters a passage which extends the whole length of the engine underneath the exhaust valves, and at the rear

end of the engine the water enters the main jacket space. Thus the chief cooling effect is produced where the greatest amount of heat is absorbed by the metal.

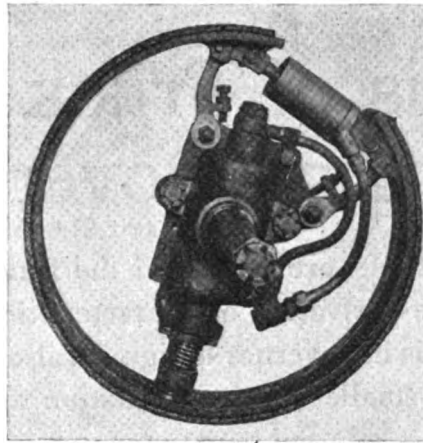
Engine, clutch and change speed gear are combined into a unit powerplant. The change gear is of the selective sliding type with three forward speeds and reverse, and is fitted with a centrally located ball handled control lever. The propeller shaft is of the enclosed type, its tube being connected to a cross member of the frame by means of a forked joint, taking up both driving thrust and torque reaction.

A double flexible disk universal joint is incorporated between the tail shaft of the transmission and the propeller shaft. Each of the two joints comprises two $7\frac{1}{2}$ -in. disks, and the two joints are about 7 in. apart. By the use of these two universal joints, a short distance apart, not only are variations in the angular relation of the transmission tail shaft and the propeller shaft allowed for, but any want of alignment of the two (failure of the axles to intersect) is taken care of.

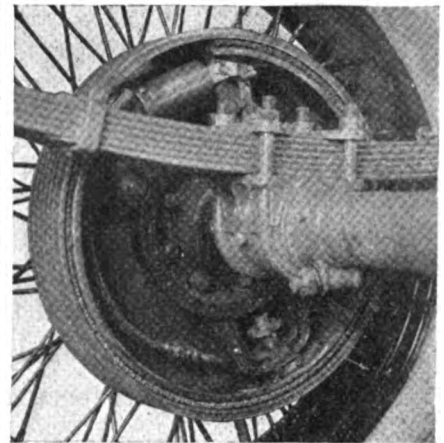
The propeller shaft is made hollow to obviate any possibility of whirling, and is enclosed in a trumpet-shaped housing, bolted to the gear carrier of the rear axle. The rear axle construction is strengthened by diagonal brace rods extending from the forward end of the "third member" to the spring shackles on the axle housing.

Spiral bevel gear drive is employed, and the rear axle is of the type having a pressed steel welded housing with Magnalite gear carrier, and an aluminum cover plate. The bevel pinion shaft is supported in one Hyatt roller bearing directly behind the pinion, and one radial ball bearing some distance forward. With the exception of the Hyatt bearing referred to, all bearings in the rear axle are of the radial ball type.

In the design of the axle, every endeavor was made to cut out all unnecessary weight so as to get the lightest possible unsprung parts consistent with the strength necessary for safety. Thus the axle shafts are made of chrome nickel steel, and drilled out by means of a gun



Front wheel brake from outside



Rear wheel brake from inside

drill. The outside diameter of these shafts near the hub is $1\frac{31}{32}$ in. and near the differential $1\frac{7}{16}$ in., while the drill hole through them is $\frac{7}{8}$ in. in diameter. The serrated hub on which the wire wheels are mounted are forged right on to the axle shaft, thus eliminating considerable machining work, obviating risks from joints, and saving weight. The rear brake drums are secured directly to the axle shafts, without intermediary parts, which is the best way of insuring continued alignment with the shafts.

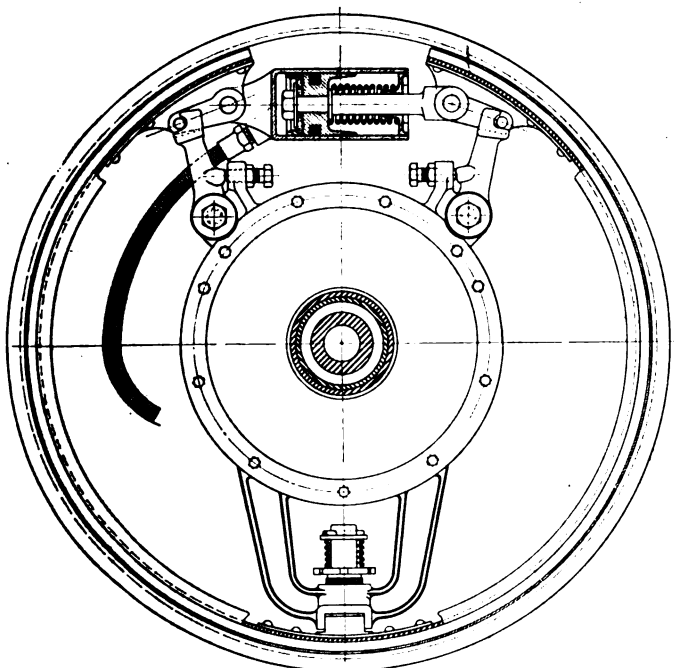
In the design of the front axle Duesenberg has reverted to the tubular type, his reason for this being that the front axle must sustain the brake reaction of the front brakes, and a tubular section has greater torsional strength than an I section containing an equal amount of material. The tube is of chrome nickel steel, and has a wall thickness of $\frac{1}{8}$ in. The steering knuckles and axle ends are drop forgings and are of somewhat unusual design, partly because the main member of the axle is tubular and partly because provision has to be made for supporting the brakes and conveying the oil to the brake cylinder endowed with a dual motion.

The frame is light yet strong, both side and cross members being made of $\frac{1}{8}$ in. chrome nickel stock. The side members have a depth over the middle portion of $6\frac{7}{16}$ in. and taper toward the ends. In the model now under development, the flanges of the frame side members will be widened where the cross members come, so as to allow for the metal taken away by the rivet holes at these points. There is one very deep and thoroughly brazed cross member at the middle of the frame, to which the forward end of the propeller shaft housing connects. Then there are a front cross member (which carries both the forward part of the engine and the radiator), one cross member at the forward end of the rear spring, two cross members almost directly over the rear axle, and one cross member at the rear end of the frame. The side members are absolutely straight, which in connection with the very substantial cross bracing insures a frame of great rigidity.

Springing is by half-elliptic springs all around, the rear pair being 59 in. and the front pair $39\frac{1}{2}$ in. long. Lubrication of the spring bolts and all other chassis parts is by the Alemite high pressure system. The fuel tank, which is of the pressed steel, welded type, is located at the rear of the chassis, and fuel feed is by the vacuum system.

One of the outstanding features of the chassis is the four wheel service braking systems. In our descriptions of French cars with four wheel brakes, it probably has been noticed that a single actuating mechanism system, known as the Perrot, is used almost exclusively. This is un-

(Continued on page 1031)



Hydraulically operated rear wheel brake

An Analysis of Truck and Tractor Engine Governors

In the following article are discussed the functions of a governor, the types in use, and the derivation of characteristic curves for each type. The application of analysis in governor design is also treated, giving changes necessary to secure smaller static fluctuation and lower stability value.

By Fred C. Ziesenheim, Mem. S. A. E.

ALL tractor engines with one exception and nearly all high grade motor truck engines are fitted with governors for limiting the speed of the engine and for automatically adapting the output of the engine to the demand put upon it. A governor is needed on tractors for both plowing and belt work, as the loads on the engine are never steady. A man operating a tractor is not able to keep the engine from speeding up and running too fast when the load is light, nor is he able to keep the engine from stalling or stopping when a heavy load is suddenly put on. Running an engine with no load or a light load at a higher speed than the engine was designed for is much more severe than trying to carry an overload. In most high speed engines, the bearing loads resulting from explosion pressures are greatly exceeded by those resulting from centrifugal and reciprocating forces, which increase as the square of the speed. Obviously, an engine fitted with a governor is more reliable and will last longer than one not so equipped.

A governor is obviously needed on truck engines to prevent overspeeding and consequent injury to both the truck and the engine.

A governor has two things to do:

- (1) It must measure the speed of the engine.

- (2) It must vary the amount of fuel supplied the engine so that the engine will run at the speed desired.

When the engine is running at the desired speed, the governor produces a centrifugal or other force which is balanced by springs; any change from the desired speed puts the arrangement out of balance; when the unbalanced force is strong enough to move the governor parts, the governor will act to adjust the speed by moving the throttle, changing the amount of fuel going into the engine. From this we note that, when the engine is running at the desired speed, the speed must vary by a certain amount before the governor will act or move to correct it. The amount that the speed has to change depends on how the governor is made. If a centrifugal governor could be made that had no friction, that would move instantly without any loss of effort or force, it would keep the engine running at exactly the same speed all the time, but since this is impossible, friction will always keep the governor parts from moving freely. As a change of speed is necessary before the governor can act, and as friction will prevent the governor from going back to its first position, the light and no load speeds will always be greater than the full load speeds, with a simple centrifugal governor.

A sensitive governor is one that requires only a small speed change to cause it to act. The degree of sensitivity expressed as "Static Fluctuation" is the difference of the no load and full load speeds, divided by their average. An engine with a no load speed of 1062 r.p.m. and a full load speed of 1000, which gives a difference of 62 and an average of 1031 r.p.m., has a static fluctuation of 6 per cent. A static fluctuation of 6 to 10 per cent is considered satisfactory for truck and tractor service. No comparative data is available giving the static fluctuation of various engines and governors. The tractor tests conducted by the Ohio State University at Columbus, Jan. 26 to 30, 1920, give the speed variations of various tractors at one-quarter, one-half, and full load as a percentage of their speed at three-quarter rated load. Some of these values are shown in Fig. 1. The wide range of speed variations obtained from many of the tractors indicates that opportunity exists for considerable improvement in regulation. A static fluctuation of less than 5 per cent for low and medium speed engines is not warranted by the service required. It would entail the use of too delicate a governing mechanism, and would not admit of economical manufacture, nor would it be reliable under continued service.

A governor characteristic other than static fluctuation which has considerable to do with regulation is "travers-

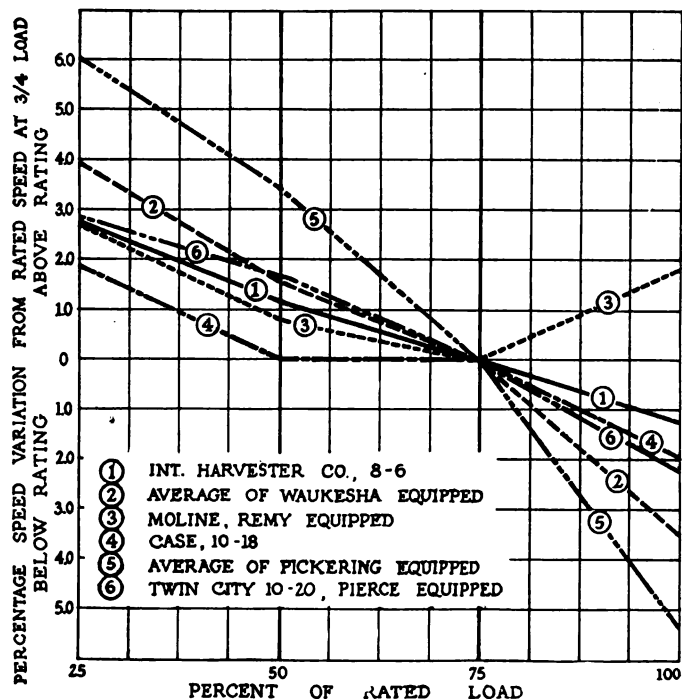


Fig. 1

ing time." It is the time which elapses from the occurrence of a speed change, until the governor has corrected that condition, and is a measure of the promptness of governing. Since it is usually only a fraction of a second, it does not admit of easy measurement.

The governor used on truck and tractor engines is usually of the centrifugal or flyball type, driven by gearing from the engine crankshaft (see Fig. 2). It consists of a governor shaft with a carrier which carries two weights or flyballs that are free to swing from the shaft on pins. When the shaft is revolved rapidly the weights will be swung out by centrifugal force. As soon as the engine is started, the weights try to swing out as far as they can go, but they are prevented by springs which tend to hold the weights in. As the engine speeds up the centrifugal force of the weights increases, exerting a greater force on the springs. As the weights move out they push a sliding sleeve along the governor shaft, the sleeve presses against a shoe or button attached to the governor lever and makes the lever turn on its shaft. A rod attached to the other end of the governor lever is also fastened to the throttle valve. The governor lever in turning starts to close the throttle valve in the carbureter, thus shutting off the supply of the fuel and air mixture to the engine. The weights and springs must be selected and adjusted so that the governor will give the engine speed desired.

An analysis of the forces acting within and upon a governor may aid in forming a conception of the variables affecting governor design. The data necessary for an analysis of a particular governor will consist of the following:

1. Principal dimensions of the governor parts and governing system.
2. Weight of all parts in the governing system which affect governor operation.
3. Center of gravity of the governor balls.
4. Tension of the governor springs throughout the governor's range.
5. Position of the center of gravity of the governor balls and the corresponding speed throughout the governor's possible range of action.
6. Throttle opening at full load speed and at the desired no load speed.

Item 5 may be obtained by suitably driving the governor through its speed range, noting the position of the sliding element or throttle actuating device, for each speed. The corresponding location of the center of gravity can be obtained from a layout. If readings are taken with constant speed increments, then with constant speed decrements, two distinct curves will be obtained showing the influence of solid friction (see Fig. 3). A mean of the two curves would be used for computing the characteristic curves, since it represents the equilibrium speed of the governor when running free from solid friction.

Item 6 can be secured by suitable engine runs, recording throttle opening at the full load speed and at the desired no load speed. A layout of the control system will indicate the governor movement necessary for each speed and load condition.

Derivation of Centrifugal Governor Characteristic Curves

Forces—

The forces existing in a centrifugal governor are,

W = sum of weights of governor balls, pounds.

S = tension of governor spring, pounds.

Q = sum of weights and forces other than spring tension which resist governor action, pounds.

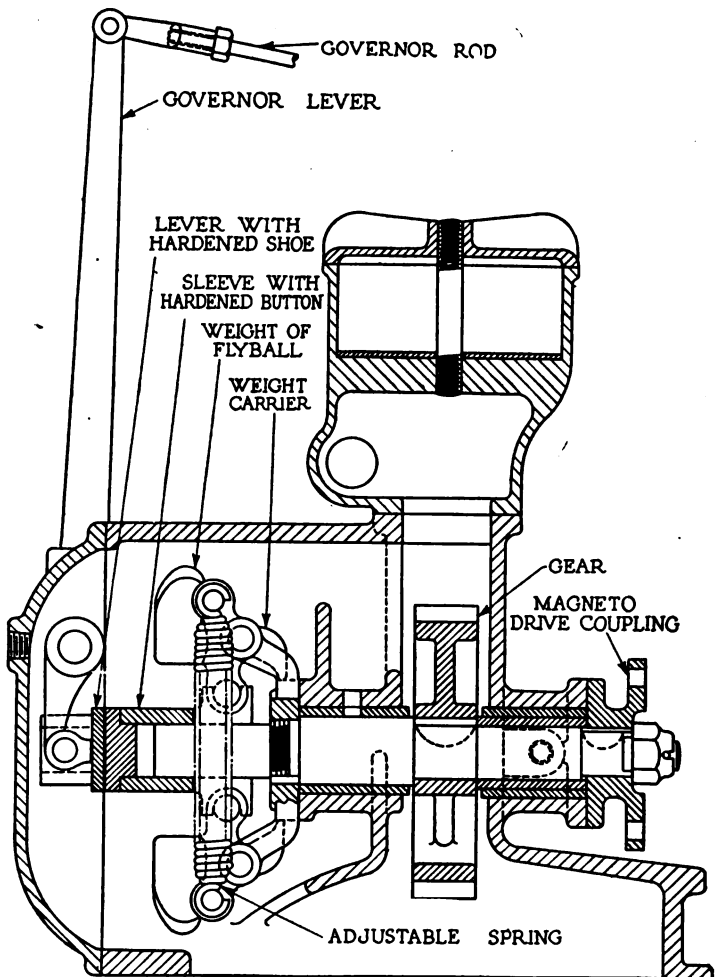


Fig. 2

Moments—

The moments of all the forces existing in a centrifugal governor are considered as acting about the fulcrum of the governor ball, through the center of gravity of the governor ball, perpendicular to the governor axis.

C_f = centrifugal force of the governor balls at their center of gravity, pounds.

C_w = moment of centripetal force of governor balls weight, pound-inches.

C_s = moment of centripetal force of spring tension, pound-inches.

C_q = moment of centripetal force of resistances other than spring tension, pound-inches.

Summation of Moments—

For a state of equilibrium, the summation of forces and moments about and through the location mentioned, must equal zero. The positive force tending to produce governor action is the centrifugal force of the governor balls. The negative force or reaction is the sum of the centripetal forces which, at any particular instant, must equal the centrifugal force for a state of equilibrium.

Computation of Moments—

Referring to Fig. 4, let

L_1 = distance, fulcrum to center of gravity of governor ball, parallel to the governor axis, inches.

L_2 = distance, fulcrum to center of gravity of ball, perpendicular to the governor axis, inches.

L_1 = distance, fulcrum to point of spring application, parallel to governor axis, inches.

L_2 = distance, fulcrum to point of spring application, perpendicular to governor axis, inches.

The value and direction of moments resulting from the weight of governor parts depends entirely upon whether the center line of the governor is horizontal or vertical. In a vertical governor, the moment of the governor ball weight C_w is plotted for various positions through the

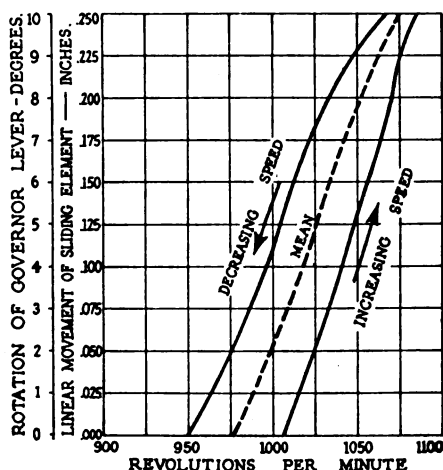


Fig. 3

range of governor ball movement, being computed as follows:

$$C_w \times L_1 = W \times L_2$$

$$C_w = \frac{W \times L_2}{L_1}$$

If the governor is in a horizontal position, when the ball is above the axis the moment of its weight will be opposed to centrifugal force, and its moment is therefore a centripetal one; whereas when the ball is below the axis, its weight moment is in the same direction as centrifugal force, and therefore it is a centrifugal moment. Since there are usually two governor balls placed 180 deg. apart, their weight moments will cancel each other and need not be considered.

The centripetal moment of the spring force is plotted for the various positions from—

$$C_s \times L_1 = S \times L_2$$

$$C_s = \frac{S \times L_2}{L_1}$$

The resisting forces Q , are composed of—

1. The weight of those parts which move when the governor ball is moved through its range, whose moment can be resolved into a resisting or centripetal moment. The weights may be that of sliding collars, counterpoise, levers, etc. Their moments are considered as acting at the center of application of the spring force; their value depends on whether the governor axis is vertical or horizontal. For a vertical governor, the moment is computed as follows—

$$C_q \times L_1 = Q \times L_2$$

$$C_q = \frac{Q \times L_2}{L_1}$$

For a horizontal governor, the moment of the weights which can be resolved into centripetal moments, would be—

$$C_q \times L_1 = Q \times L_2$$

$$C_q = \frac{Q \times L_2}{L_1}$$

2. The resisting forces incident to or generated by the governor itself, as frictional resistance, forces resulting from lack of balance of rotating parts, and forces other than spring tension which can be resolved into resisting moments.

3. The weight of parts other than those of the governor itself, whose moment can be resolved into a resisting moment, such as valve gear, levers, etc.

4. Resisting forces other than those of the governor itself which may be imposed upon it, as valve gear friction, forces caused by an unbalanced throttle valve, throttle valve springs, etc.

5. The moments of the resisting forces and weights which are known are computed and plotted as acting through the center of gravity of the governor ball about the ball fulcrum, in accordance with the manner outlined.

The centrifugal force of the governor balls acting through their center of gravity, perpendicular to the governor axis, is—

$$C_f = 0.00034 W R N^2$$

where

W = weight of governor balls, pounds.

R = radius of center of gravity of governor balls, feet.

N = revolutions per minute of governor balls.

The values of R and N are obtained from Item 5, "Position of the balls center of gravity and the corresponding speed"; or from the mean curve of Fig. 3. After plotting the centrifugal force curve C_f for various values of R and N , a curve is plotted which represents the sum of the known centripetal moments, C_w , C_s , C_q , etc. Subtracting the values of the summation of centripetal moments from the C_f curve, gives the values of C_g which could not be analyzed and computed. Constructing a curve of the C_g values thus obtained, gives the frictional characteristic curve of the particular governor, which values can be used in the design of similar governors.

Analysis of Governor Characteristic Curves

An analysis of the characteristic curves of centrifugal governors such as shown in Fig. 4 can be made on the following points:

Static Fluctuation—By definition, static fluctuation is a measure of the closeness of speed regulation, since it is the difference of the no load and full load speeds, divided by their average.

Where—

p = static fluctuation.

U_u = no load speed, revolutions per minute.

U_d = full load speed, revolutions per minute.

$$p = \frac{U_u - U_d}{\frac{1}{2} (U_u + U_d)}$$

A governor with a small static fluctuation is spoken of as being a sensitive governor, hence the sensitiveness of governing is closely related to the value $1/p$.

Referring to the C_f curve of Fig. 4, when the no load and full load speeds differ by only a few per cent, it is permissible to state that the static fluctuation is the difference of the tangents of the angles I_u and I_d , divided by twice the tangent I_u . The angle I_u is formed by a line from the origin at the axis of the governor, to the upper portion of the C_f curve that is being considered. The angle I_d is formed by a line from the origin to the lower portion of the C_f curve that is being considered. The static fluctuation then becomes

$$p = \frac{\tan I_u - \tan I_d}{2 (\tan I_u)}$$

Stability—The stability of a governor means its ability to return to a position of equilibrium after it has been displaced from that position, and it is measured as restoring force at unit displacement. Stability relates to the work capacity of a governor; it is the force available for overcoming passive resistance; it indicates the ability of the governor to act as a shock absorber. The stability required depends upon the passive resistances that the governor must overcome in accomplishing its purpose, and also upon the nature and extent of the active forces impressed on the governor from external sources. Stability of regulation and the smallest permissible static fluctuation, depend in part only upon the properties of the governor, a large part of the responsibility rests with the engine itself. An unstable governor is one in which the restoring force is negative, urging the governor farther away from its position of equilibrium when there is a change of speed. If regulation is stable, the governor will not hunt or give erratic action at full load.

It has been determined experimentally that the stability can be simply expressed as the difference of the tangents to the angles K and I . The angle K is formed by a tangent to the C_f curve at the point where it is desired to determine the stability; the angle I is formed by a line drawn from the origin through the same point.

The stability then is

$$Z = \tan K - \tan I.$$

The governor is stable as long as angle I is less than angle K , or angle K is within the angle I . If a governor is too stable, an excessive speed change will be necessary to cause it to move to a correcting position. An increase in the slope of the $\tan K$ will result in an increase in stability, and likewise an increase in static fluctuation. The stability should be at the minimum value necessary for the particular conditions, allowing the static fluctuation to be small.

Application of Analysis in Governor Design

Changes in the design of a governor and control system to secure a smaller static fluctuation and a lower stability value may be enumerated as follows:

1. Using only a small portion of the total travel of the governor-balls for speed regulation will give a smaller static fluctuation, since the angles I_u and I_d will approach each other, their difference becoming less. This can be accomplished by using a throttle valve requiring less than 90 deg. total movement, as 60 deg. or less. The limiting condition is when the total movement becomes so small that hunting or periodic speed fluctuations ensue.

2. Increasing the weight of the governor balls will increase the values of the C_f curve. If the location of the ball center of gravity remained the same, the new curve would be parallel to the original one, though of greater value. The difference of the tangents of angles I_u and I_d will decrease, and the static fluctuation will decrease proportionately with increase of ball weight. The stability likewise decreases, but not as rapidly.

3. Change of spring characteristic, so that the spring tension will increase more rapidly with change of spring length, thus giving the C_s curve a greater slope. The springs will then exert a greater resisting force to the centrifugal force of the governor balls, at the higher speeds. This will cause the C_f curve to have less slope, and thus reduce the static fluctuation.

4. The length of the lever arm L , of the spring hanger may be increased so that a greater tension will be exerted at higher speeds, reducing the static fluctuation in a similar way as by method 3.

5. On decreasing the radius of the center of gravity of the governor balls about the governor axis, by moving the center of gravity of the balls, and therefore the force curves, nearer the axis of rotation, causing the angles K and I to approach each other, the difference of their tangents, which is equal to the stability, will become less, and the governor will become less stable and more sensitive.

6. Increasing the radius of the governor ball center of gravity about their fulcrum increases the arc path of the center of gravity. This causes the C_f curve to have less slope and brings the angles K , I_u , and I_d to approach each other, reducing their differences, thereby reducing static fluctuation and stability.

7. The values of the C_q curve can be lessened by decreasing the frictional resistances of the moving parts; by decreasing the weight moments of the levers; by the elimination of throttle valve torque by using a balanced throttle valve; and by the elimination of throttle springs by using a balanced throttle valve.

Changes in the position of the governor balls with

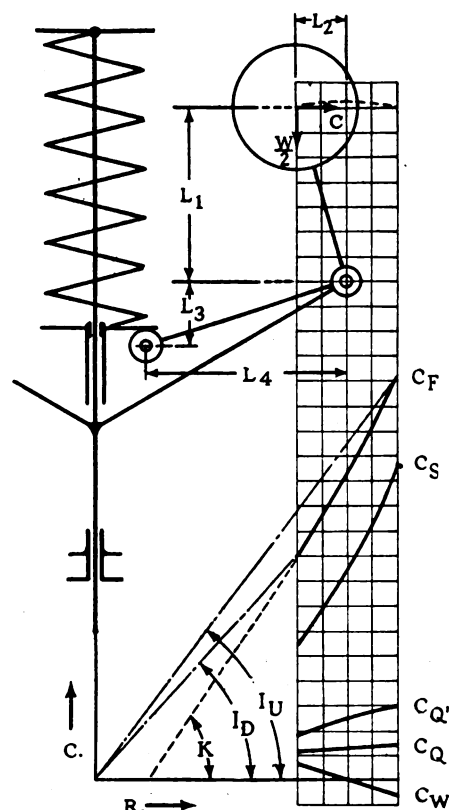


Fig. 4

change in speed are converted into a linear movement of sliding members along the governor axis and are transmitted by levers and rockershafts to the throttle. The parts in the system should be designed with a minimum of frictional surface and resistance, and weight moments. Many of these parts can be eliminated by placing the governor directly at the throttle, driving it through shafting and bevel gearing, and operating the throttle with a simple bell crank. See Fig. 8. The ordinary 90 deg. butterfly valve produces a torque due to the difference of pressure on its upper and lower faces, when approaching the closed position. See Fig. 5. The pressure drop takes place with less travel at the bottom of the valve, and a greater pressure difference will therefore exist at the bottom than at the top. A balanced throttle valve will be free from air flow torque in all positions, obviating the use of springs. A balanced throttle valve is shown in Fig. 7.

There are three types of hardened thrust buttons and shoes for receiving the linear movement of the rotating parts and transmitting it to the non-rotating elements. See Fig. 6. The flat surface type of thrust button and shoe offers the greatest frictional resistance and suffers the greatest wear. The ball type is next. The conical type is the most satisfactory, since the cone apex has contact with the thrust button at the governor axis where the angular velocity of the rotating button is zero. In all three types, with the governor in mid position, the center

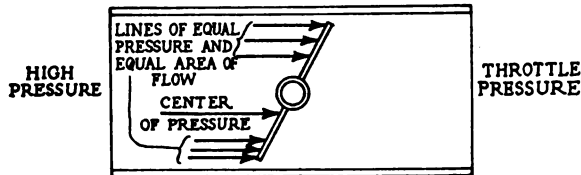


Fig. 5

of the rocker shaft should be in a line passing through the point of contact of shoe and button, perpendicular to the governor axis.

Steam turbines and other prime movers in which close regulation is imperative, use hardened knife edges and hardened seats for supporting the governor balls and transmitting their movement to the sliding sleeves. The knife edges are not lubricated, as a lubricant would retain abrasive material on the hardened seats, causing excessive wear. Refinements of this character are unsuited for truck and tractor engines, as the knife edges would deteriorate too rapidly from the vibration and action of oil and grit.

The governor balls should be machined all over to insure absolute similarity with respect to total weight, the location of the center of gravity, and the location of the center of support, or fulcrum. When the governor is up to speed, any variation from exact similarity will cause unbalanced couples, vibration, binding action on the supporting pins, and frictional resistance to change of position.

The method of application of the governor spring force should be such that the unbalanced forces and frictional resistances will be a minimum. A single spring mounted on or along the governor axis, is preferable to two springs mounted on the governor balls. In the latter design, unbalanced forces will result from the lack of uniformity in spring tension, weight and suspension.

Constructing Characteristic Curves for a New Governor

The procedure for utilizing the characteristic curves of a particular governor as the basis of design of a new governor, is as follows:

1. Assume a location for the governor ball fulcrum with respect to the governor axis.
2. Locate the point of application of the device for transmitting the movement of the governor balls to the sliding member.
3. Ascertain the angular movement of this device necessary for completely opening and closing the throttle. Plot its arc path.
4. Locate the center of gravity of the governor ball. Plot its arc path with reference to the arc path of (3). The center of gravity is usually taken so that a line passing through the ball fulcrum parallel to the governor axis will bisect the arc path of the center of gravity.
5. Determine upon the weight of governor ball which, acting through its center of gravity, will give the desired centrifugal force values.
6. Compute the centrifugal force values and plot the C_f curve.

The centrifugal force values can be computed as follows:

$$\text{Centrifugal Force, } C_f = 0.00034 W R N^2$$

Where—

W = Weight of governor balls, pounds.

R = Radius of balls, feet.

N = Revolutions per minute.

The relation between the engine speed, throttle opening and position of the governor parts can be determined by running the engine at the desired full and no load speeds, observing the corresponding throttle openings, then, by a suitable layout, determining the corresponding positions of the governor parts. Compute and plot the C_f curve, assuming a speed range and governor action considerably in excess of that desired, in order to observe the curves at other than the range that will be utilized.

7. Plot the C_q curve of the known resisting forces that can be computed.

8. Plot the C_q' curve of the unknown resistances. Compute their values from the C_q' curve of the original governor as moments about the fulcrum through the center of gravity of the balls, by a comparison of the new and original moment arms.

9. Plot a curve representing the sum of the C_q curves.

10. Subtract the total C_q values from the C_f values, plot their differences as the C_s curve. The moment of the spring force, plus the other centripetal or resisting moments, must equal the centrifugal forces for a state of equilibrium.

11. Assume a point of application of the spring force, compute from the C_s curve and from the moments involved, the spring tension required throughout the governor range.

12. Compute the type and size of spring that will give the required spring characteristic. If a spring of impractical dimensions is obtained, change the assumptions of (11), and recompute.

13. Note the static fluctuation and stability of the new governor for the speed range desired of the engine.

The effect of the numerous variables of governor design can be noted by means of the characteristic curves. Upon completion of a preliminary design, running tests should be conducted and a set of characteristic curves constructed on the basis of the tests. Further analysis and refinement can be continued until satisfactory governing is secured.

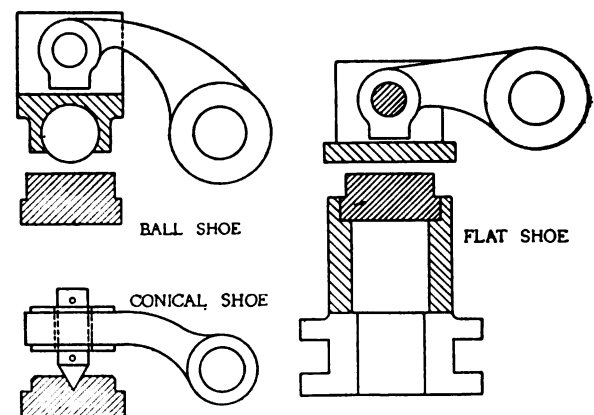


Fig. 6

Governors having combined inertia and centrifugal elements will maintain very close speed regulation, can be manufactured economically, and are reliable under continued severe service. A static fluctuation of $1\frac{1}{2}$ per cent is easily secured from steam turbines, reciprocating steam engines, gas and oil engines, by the use of such a gov-

error. The traversing time for this type is considerably less than that of a purely centrifugal governor, since the more suddenly the change in speed is applied, the more promptly the inertia element will act.

A pure inertia governor having no centrifugal element will consist of a rotating element as a balanced flywheel, in which the speed change relative to the engine can result only from a change in the angular velocity of the engine shaft. The inertia governor obtains its regulating force from the tangential inertia resulting from a change

error is entirely too sluggish for close regulation, its traversing time is too great. The small reciprocating steam engine encounters similar load conditions to that of the tractor engine, but close regulation is achieved by the use of combined inertia and centrifugal force governors. A governor of this combined type admits of more economical manufacture than a centrifugal governor capable of securing the same regulation.

The Pierce Governor

As an example of contemporary centrifugal governor design, the Pierce governor as manufactured by the Pierce Governor Company of Anderson, Indiana, has met with marked success in both motor truck and tractor service. Examining its design with reference to that section of this article entitled, "Application of Analysis in Governor Design," it is found that many of the recommendations mentioned have been incorporated in the Pierce governor.

The throttle valve, shown in Fig. 7, has a total movement of 56 deg., and complete opening and closing is accomplished with a minimum movement of the governor weights. The sliding plunger, which transmits the governor weight movement, is contained within the spider shaft and the governor spring is located in a separate compartment. The governor weights are placed near the governor axis. This design permits a minimum radius for the weight center of gravity about the governor axis and produces a sensitive governor as enumerated under item (5).

The governor weights are comparatively long, their center of gravity has a long radius about their fulcrum, thus securing improved regulation as noted in item (6). In eliminating the usual levers and shafts by attaching the governor directly at the throttle, considerable frictional resistance is avoided. Using a balanced throttle valve, eliminating the throttle springs and throttle reactions, removes a very considerable resistance to governor action. The single governor spring is distinct from the rotating elements, and its tension can be changed while the engine is running, permitting a limited speed adjustment. The adjusting screw can be sealed to prevent its being tampered with. The use of ball bearings and

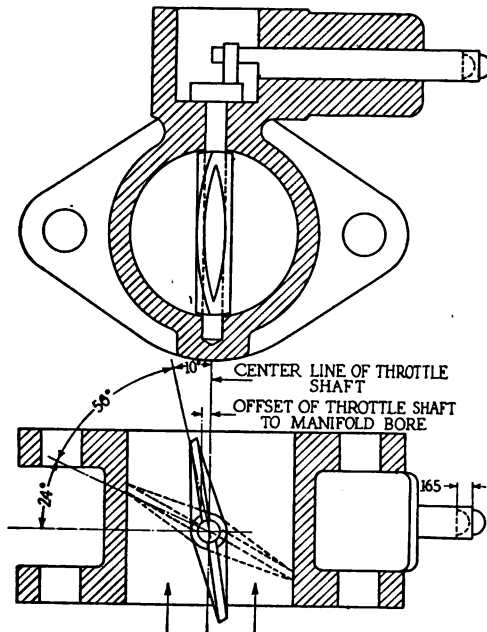


Fig. 7

in the relative angular velocity of the engine and inertia elements. If the engine load is released and the engine speeds up, the inertia element will remain at the original speed, the regulating force available is the product of the relative change in angular velocity of the engine and inertia element, times the moment of inertia of the inertia element. Similarly, an increase in load and decrease in engine speed, produces tangential inertia which is available for correcting the speed condition.

A governor consisting only of inertia elements is impracticable, since it does not adjust for any particular speed, but simply tries to keep constant the accidental speed at which the engine happens to be operating. To secure a governor that is practical, it is necessary to combine tangential inertia with centrifugal force by introducing a centrifugal element which will act as a speed counter.

There are several features of a combined inertia and centrifugal governor which recommend it for tractor service. It can be designed to overcome a considerable resistance in the throttling mechanism and still obtain close speed regulation. The more frequently and suddenly the load changes are applied, the greater the regulating force available in the inertia element, since the tangential inertia will be exactly proportional to the change in angular velocity. Likewise, the traversing time of this type is much less than that of the usual centrifugal governor. The load variations of tractor service, especially with belt work, are of considerable amplitude and fluctuate quite rapidly. The usual centrifugal gov-

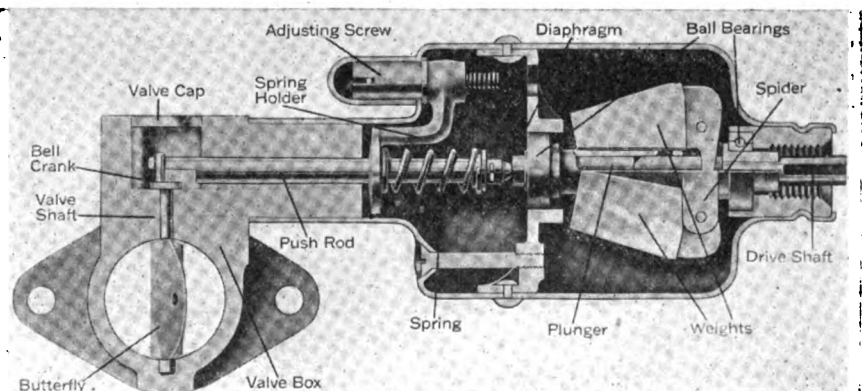


Fig. 8

the mounting of the governor free from interference with the hand throttle are likewise commendable features.

THE Italian Government has forbidden manufacturers of automobiles and motors to sell more than 10 per cent of their production in the country. It is hoped that by selling the bulk of Italian automobile production abroad an improvement in the rate of exchange can be effected. Large numbers of automobiles and quantities of automotive parts are said to leave Italian ports almost every day.

Case-Hardening Process for Crankshafts Successfully Developed

After considerable effort and experiment a process for case-hardening crankshafts has been developed which meets the requirements of efficient production. Shafts are now in regular production under this method, which is described in detail in the following article.

By Norman G. Shidle

CASE-HARDENED crankshafts are common in Europe, where bronze bearing bushings are used, but are a novelty in this country. The development of a satisfactory process for case-hardening cranks involves many difficulties. While the theory of the process is well understood, it is not easy to meet the requirements of economy and efficient production. Such a process has been worked out, however, by one automobile manufacturer, and case-hardened crankshafts are being produced regularly. Some minor difficulties still remain to be solved, but the process, as now being used, is satisfactory both as to methods and results.

Tests made by the H. H. Franklin Manufacturing Company have shown that a car with case-hardened crankshafts can be driven an average of 50,000 miles before the bearings require to be readjusted. Thus the results obtained from the case-hardened shafts are commensurate with the increased cost of production. Because of the novelty of the practice in this country, a detailed description of the methods should be of particular interest.

The points of interest are those in which the manufacture of the case-hardened crankshaft differs from the manufacture of the ordinary shaft. All of the operations performed in the production of the ordinary shaft are necessary as well in making the case-hardened shaft. The description may start, then, at the point where the methods differ.

Since it is necessary to straighten the shaft after it has been case-hardened, its elasticity must be retained; certain parts must be shielded against the hardening process. The two ends of the shafts, moreover, must be left soft, so that they may be machined to fit properly with the cranking clutch and the driving clutch. For this purpose $\frac{1}{8}$ inch of stock is left on both sides of the flange and thread ends. To leave certain parts soft, then, was the first problem. Only the bearing surfaces of the crankshaft are case-hardened.

To accomplish this, the bearing surfaces are wrapped with ordinary electrician's tape. The shaft is then copper-

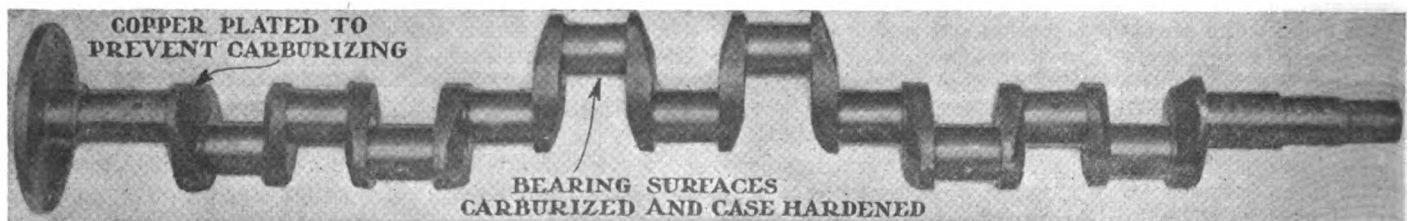
plated, a process requiring about twenty minutes. Thus the copper-plating covers the cheeks and the ends, but it is excluded from the bearing surfaces which are to be hardened. Other methods of excluding the copper plating from the bearing surfaces have been tried, but none have been successful. Various kinds of compounds and paints were tried, but were rendered ineffective by the strong acids to which the shaft is subjected preparatory to the copper-plating process. Iron clamps lined with rubber have also been tried. These exclude the copper-plating successfully, but become rusted and stiffened rapidly and are thus made very difficult to use.

The tape has been found to best meet the requirements, but is open to the objection of requiring considerable time to wind and remove. This is one of the points in the process which will probably be subjected to further refinements.

After the cheeks have been copper-plated and the tape has been removed from the bearing surfaces, the crankshafts are taken to the carburizing ovens. Four double chamber ovens (Fig. 1) are used, each having a capacity of fourteen shafts. The shafts are packing oblong metal carburizing boxes, illustrated by Fig. 2. Two shafts are contained in each box. The boxes are then placed in the carburizing furnaces and allowed to remain there about 22 hours. This length of time was determined by experiment as being necessary to obtain the depth of penetration desired.

When the boxes have been removed from the carburizing furnace they are allowed to cool gradually. When the shafts are cool enough to handle, they are removed from the carburizing boxes and taken back to the machine shop to be straightened. This is the first of the straightening operations, of which there are two; that is, the shaft must twice be trued up, once during the process and once at the end. The reason for this will be apparent later.

Since the copper plating of the two ends and the cheeks has resisted the carburizing, the shaft still retains its elasticity, and thus is capable of being straightened.



Franklin six-cylinder crankshaft. Arrows indicate parts which are case-hardened, and parts left soft to allow shaft to retain elasticity for straightening

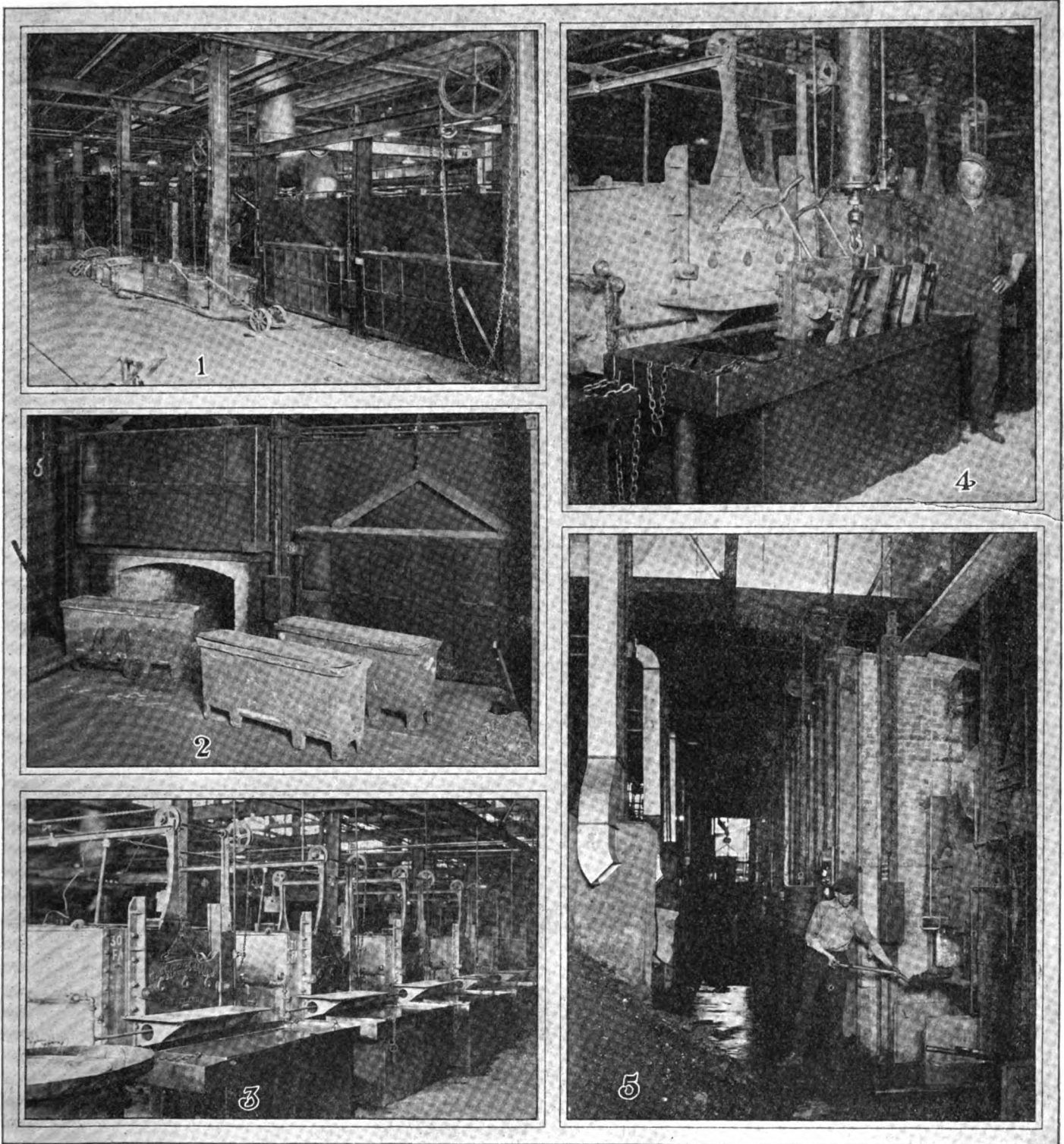


Fig. 1—Ovens used in carburizing operation. Fig. 2—Carburizing boxes, in which shafts are placed before being put into ovens. Fig. 3—Furnaces and cooling tanks used in case-hardening. Fig. 4—Specially constructed die, in which shaft is placed when removed from furnace. When the shaft has been clamped in the die, the whole die is immersed in cooling tank. Fig. 5—Blower ventilating system is used throughout the heat-treating department. This illustration shows the installation in the firing pits

Next, the machine work is done on the flange and thread ends, the $\frac{1}{8}$ in. stock being removed and the parts machined to their proper sizes.

The ends having been machined and the shaft trued, it is ready for the final hardening process. The shaft is taken back to the heat-treating department, placed in a furnace and heated to a temperature of about 1420 deg. The furnaces used for this operation are shown in Fig. 3. It remains in the furnace for three hours, and is then

removed and quenched in cold water in a convenient tank.

At this point another serious difficulty was met and overcome. It was found that if the shafts were merely quenched after being removed from the furnace, they twisted out of shape so far that subsequent truing was practically impossible. To meet this trouble, a die, shown in Fig. 3, was devised, into which the hot shaft is clamped. This die is handled by means of an overhead monorail system and an air hoist. The whole die is then

plunged into the cold water and the shaft remains approximately true as the case-hardening process is completed.

Since the die is accurately constructed to the form of a straight crankshaft, the shaft must be approximately straight when it is placed in the die; otherwise the die will jam, and the operation be spoiled. This is the reason for the first straightening operation after the shaft has been carburized.

This special die is very heavily made of cast iron with "V" blocks of hardened high grade steel, which come in contact with the bearing surfaces of both main line and crank pin bearings. The small area of contact where these "V" blocks touch shaft remains soft. These spots on any one bearing, however, are so small as not to interfere with the wearing qualities of the finished bearing.

Taking the shaft from the furnace and placing it in the die must be done very rapidly. If too long a time elapses between the time the shaft is removed from the furnace and its immersion in the water, the shaft will be too soft when finish ground. Considerable study of this operation and some changes in the original construction of the die were necessary in order to have the operation performed rapidly enough. The shaft is now removed from the furnace, placed and clamped in the die and immersed in water in about 25 seconds. This speed is rapid enough to give the shaft the desired degree of hardness.

The next step is to straighten the shaft again. The problem of straightening was one of the most difficult encountered throughout the process. As noted in the steps described, every mechanical precaution is taken to keep the shafts approximately straight throughout the various stages of manufacture. Even with these aids, however, much depends upon the final truing process. For some time, the difficulty of getting this work done, accurately and rapidly enough to meet production needs, was so great as to threaten the success of the entire process.

Several skilled men were put on the job, however, paid on a day rate, and given every opportunity to become proficient. In this way four or five skilled men were developed to do this truing job. These men have become so proficient that they can adequately handle the production needs of the plant in this respect. The job which they are doing cannot be done mechanically, yet it is one of the vital steps in this process of case-hardening crankshafts. Thus even in this predominantly technical process, the human element plays an important part. If it had not been possible to develop the skill of these men to a high point, the entire process would probably have had to be abandoned as not being practical for production purposes.

After the final straightening, the bearing surfaces are finish ground with a very fine grinding wheel, and the finished machine work is done on the soft parts of the shaft.

Results Justify Work

H. P. Harrison, master mechanic of the Franklin factory, to whose efforts the successful development of this process is largely due, states that there is about one-third more work involved in the manufacture of a case-hardened crankshaft than in the making of the ordinary soft shaft. While no accurate cost figures are yet available, Mr. Harrison says that the excellent results obtained from the case-hardened shaft fully justify the additional expenditure necessary to manufacture them.

In making the Franklin shaft a machine steel forging having a carbon content of 15 to 20 points is used. A depth of case of 1/16 in. is required. The degree of hardness to which the shafts are brought is between 75 and 85 points, as indicated by scleroscope reading. A working range of between 65 and 100 points is allowed.

Longitudinal shrinkage was another difficulty encountered. No longitudinal shrinkage occurs as a result of the carburizing process, but after the shaft is finally quenched this trouble appears very distinctly. Experiments showed this shrinkage to be approximately uniform, however, so that it can be overcome by simply machining the shaft a certain predetermined amount longer than required by the gages for the finished shaft. A slight distortion in the spacing of the crank pins was also found, but was not serious enough to require correction.

While the above description embraces the various steps in the actual process of case-hardening crankshafts, certain important corollaries have been instrumental in making the process a practical and commercial success.

The handling of the carburizing boxes, for instance, is accomplished by means of an overhead hoist and conveyor system, which permits the movement of a fully packed, 550 lb. carburizing box quickly and efficiently. This monorail equipment is used in moving loaded boxes from the charging floor to the cooling floor and also from the cooling floor to the packing floor. A special mixing and sifting apparatus has been installed to handle the large amount of carburizing material necessary for this work. A power driven elevator with a storage hopper has been installed for use in loading boxes with carburizing material by simply allowing it to flow by gravity from the hopper to the boxes.

A specially designed tank has been constructed in which to quench the shafts. The water is fed into this tank from a horse-shoe pipe in the bottom, and is ejected by an equal overflow on all sides. Thus every part of the tank is constantly being filled with fresh water, the distribution of which is equal throughout.

Human Element Studied

Besides the straightening operations, which depend to a large extent upon human skill, it will be noted that the bringing of the hot shaft from the furnace, clamping it into the die and quenching it is also a vital point in the process. This operation, too, depends largely upon the deftness and skill of the men doing the job.

Since the human element is so important in supplementing the mechanical phases of the process, special attention has been given to providing conditions under which men can do the best work. The monorail system for handling heavy work is one example of this assistance. The blower ventilating system which has been installed is another and very important feature in helping to render this process practical and successful. A blower system, operated by a powerful fan, constantly brings fresh air into the heat-treating department, the foul air being passed out through the movable section of the saw-tooth roof. This system was installed in preference to a suction system, because the latter was likely to be "short-circuited" by an open door or other opening.

The result is that this department, usually an extremely hot, dirty and unpleasant one, offers as pleasant working conditions as any other in the plant. The men in the firing pit, for instance, are specially benefited by this ventilating system. A separate pipe brings fresh air to each fireman, so that he is not affected by the gases and fumes common to his working place. Fig. 5 shows this installation.

Special care is taken to keep this department clean; the saw-tooth roof provides adequate light, steam coils give standard temperatures in cold weather, and in every way the workmen, upon whom the success of this new process largely depends, are given an excellent opportunity to perform the best service.

In analyzing the part played by the human element in this process, the necessity for keeping the same men on

the job is obvious. High labor turnover, with the constant necessity of breaking in new men to these comparatively delicate tasks, would mean much loss both in time and money. The efficacy of such provisions for the heat-treating department as have been made here is evidenced by the statement of George Deutcher, the Franklin employment manager.

Mr. Deutcher was asked if there had been any appreciable difference in the labor turnover of the heat-treating department since the installation of the new ventilating system. His answer was something like this:

"Before the installation we had the greatest difficulty in keeping men at work in that department. The labor turnover there was about four times as great as the average plant turnover, the latter having been 64 per cent during 1919. Our labor turnover in that department now,

I can almost certainly say, is slightly lower than the average for the plant. This result is due in part to exceptional human relations work on the part of the foreman, and in part to a readjustment of working hours; but a large part can safely be attributed to the provision of working conditions which are exceptional for a heat-treating department."

The present discussion has given in detail some of the chief problems that were met in one of the first successful attempts in this country to manufacture a case-hardened crankshaft for a passenger car. The process as it now stands will probably be subjected to further refinements as experience shows where improvements can be made. It has reached a sufficient point in its development, however, to be termed successful in a practical way, and consequently its details hold a special interest.

Electric Furnace for Spring Tempering

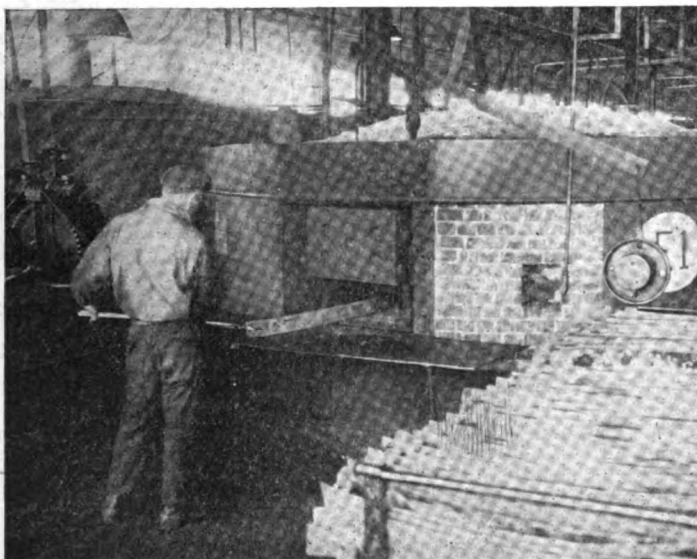
OWING to the accuracy with which the temperature in electrically heated furnaces can be controlled and the uniformity of heat distribution which can be obtained, electric furnaces should be particularly suitable for use as tempering furnaces for vehicle springs. Two such furnaces have been recently installed by the Spring Perch Co. for tempering automobile and vehicle springs. These furnaces are round in form and about 12 ft. in diameter, the hearth consisting of a revolving steel table, 128 in. in diameter. These tables are driven by an electric motor, and the speed can be varied from one revolution per hour, to one in twenty minutes, according to the class of work to be done. The springs are put on this table through a door in the side, and taken out of the same door when finished. With this arrangement the production is about 2000 lb. per hour for each furnace, or in a sixteen hour day the two furnaces turn out about 64,000 lb.

The electric heating units are installed in the roof of the furnace, about 10 in. above the table. They are of the General Electric Co. 950 deg. F. type of heating unit, and from a connected load of 85 KW for each furnace. The roof of the furnace is arched, so as to reflect the heat, and give an even distribution of heat throughout the interior

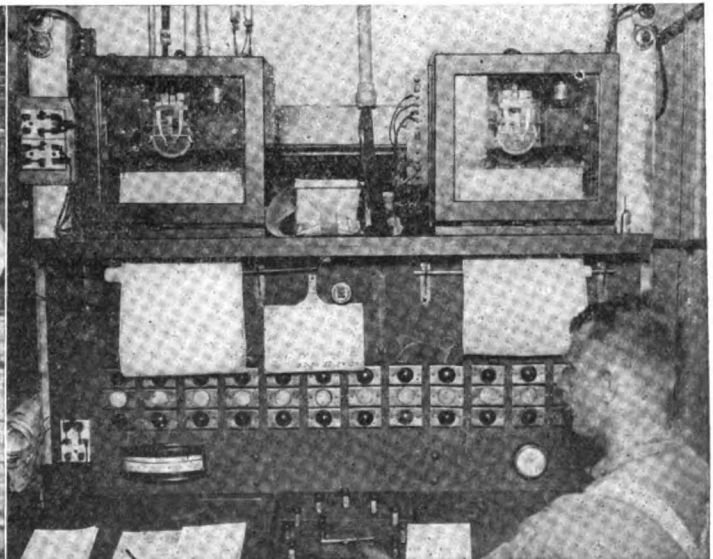
of the furnace. All hot spots which would cause some springs to be heated more than others, or otherwise destroy the uniformity of the product, are said to be eliminated by this method of construction.

The control, which is entirely automatic, was also supplied by the General Electric Co. and consists of a contractor panel for each furnace, controlled by a temperature regulator, which is installed in a booth at some distance from the furnace. All that is necessary to obtain any temperature desired between 800 and 1000 deg. F. is to set the regulator and close the switch for that furnace. Owing to the automatic control the furnace will run itself, and keep to the exact degree of heat required. Since it is desired to vary the degree of heat, in accordance with the varying composition of the springs to be heated, the value of reliable and flexible temperature control at all periods is self-evident.

Accurate temperature control and evenness of heat distribution for any temperature are the factors that guarantee uniformity of the finished product. The Spring Perch Co. subject all their products to a Brinell test to determine their perfection before shipping, and claim that they are almost absolutely uniform.



Electrically heated rotary type heat treating furnace in actual operation



Recording and indicating automatic control instruments on top of panel

Co-operative Store Educates Employees in Business Principles

While the primary object of the co-operative store is to beat the high cost of living, it may also serve as an effective means of teaching the employee the difficulties of finance, selling, and business administration. When the company runs the store this educational effect upon the employee is lost.

AN employee can often be taught more about the necessity for and the difficulties of finance and sales by a little practical experience than by hearing a great many talks and reading a great many pages of type.

A visitor to a large Ohio tool works the other day was introduced to one of the shop foremen. After the usual formalities were passed, the foreman asked the visitor, "Are you in mechanical production work?" The visitor answered that he was not. "Well, you should be glad of that," the foreman said, "as in this sort of work you certainly have a lot of troubles. But," he added suddenly, "producing the machines is only a small part of the business, and not the most difficult at that. The big thing is to sell the machines after they are built.

"I was mixed up in a little outside business deal myself not long ago, and I found out for the first time how important selling the product is, and how hard financing is. Selling is the big thing. That's what I tell these fellows in here. A lot of them think that all they have to do is to build the machine, shove it out of the door, and collect the money in their pay envelopes. It would be easy if that was all there was to it.

"I never realized the importance of the selling angle until I had this little business experience recently, and since then I've been telling a few things to these birds that think there's nothing to it but to build the machines."

It is not possible, of course, for every workman to go through an experience such as this foreman did, but the influence of one such man spreads very widely throughout a shop. The co-operative company store often loses a valuable opportunity in this respect, when the management takes over all the bookkeeping and administration work.

Co-operative Store Under Employee Control

A manufacturing plant in Rochester, N. Y., which employs about 1100 persons, has a co-operative store in successful operation which illustrates the feasibility of having the entire control of financing, operation and administration in the hands of the workers. This store is conducted by the employees of the Art in Buttons, Incorporated, button manufacturers.

The store was started by a number of employees on their own volition. In fact, the president of the company stated recently that it had been in operation some two months before he was aware of its existence. In the beginning only one or two articles, the retail price of which had gone up very high, were carried. The original stock was financed by the joint contributions of about ten employees, who bought this limited stock and sold it slightly above cost; high enough to cover merely the expense of handling, transportation, etc.

The experiment having been thus far successful, additions were made to the stock of goods, further financing

being done from the proceeds of the first operations. The only thing which has been furnished by the company is the space for the store, and the light and heat necessary for operating it.

The store now carries a full line of staple groceries, including sugar, crackers, baking powder, bran, two grades of beans, cheese, citron, cocoa, coffee, cornstarch, breakfast foods, flour, fish, gelatines, several grades of canned milk, soap, tea, tomatoes, tobacco, and so forth.

Service in the store was for some time on a voluntary basis, various girls and men giving a part of their spare time to selling the goods. This method is still used to a large extent, so that the store is open only outside of working hours. For the week-end rush, however, it was found necessary to employ a girl especially to sell goods in the co-operative store. The wages of this co-operative employee were met by a slight increase in prices.

The administration of the store operation is under the employees' council, a group elected by the employees from within their ranks to represent them in relations with the management and in the conduct of various employees' activities.

The following bulletin issued by the co-operative Grocery Committee of the Council indicates briefly the methods used in selling, ordering and delivering goods to the customers.

HOW TO GET GROCERIES FROM THE EMPLOYEES' CO-OPERATIVE GROCERY STORE

Write your order on slip of paper and drop it in the box at grocery store, through slot in wall of the store.

A sign is posted where this box is located.

Put your order in from two to four days before you want it. Four days before is better. This gives us a chance to put up the order and have it ready when you call for it.

Friday afternoon and Saturday noon Mr. Burns, who is cashier, sits at the cashier's window, and you give him your name and pay for the goods you have ordered. He issues to you the original copy of your order as your receipt at the large opening next to the cashier's window, and your order will be handed out to you, and on it is the duplicate of the copy of your order.

If by any chance we are out of any item on your order, keep this duplicate slip and present it again and if the goods are in you will receive them. If not in and you want your money back, present the slip to the cashier and you will receive your money.

Remember that this is a co-operative store, the committee of workers are volunteer workers who finance and do all of this work without pay and you as patron of the grocery are a member of the co-operative group, and the committee asks you to kindly follow the foregoing system. *Any deviation from this system makes more work for the Committee.*

We sell candy, nuts, tobacco, gum, oranges, etc., without an order at noon. Not groceries.

DON'T ASK US TO PUT UP GROCERY ORDERS AT NOON. GET YOUR ORDER IN AHEAD AS REQUESTED ABOVE.

Don't ask us to sell anything after 12.55, as the committee has to get to their respective departments at three minutes before 1.

CO-OPERATIVE GROCERY COMMITTEE.

Thus far the inception and growth of the Art in Buttons co-operative store closely parallels that of a similar store established recently in a large automobile plant. Both grew along similar lines and finally found it necessary to hire someone to help out in the actual operation of the store. At this point the development diverged.

At the automobile plant, the management offered, in the best of good-will and desire to be sincerely helpful, to take over the onerous burden of bookkeeping, as well as that of financing and operating the store. Thus the employees were relieved of that extra task. The company's offer was made in thorough good faith. It was accepted. The store is at present running successfully on the new basis.

The employees who started that store have gained a knowledge of the great difficulties of administering any business, no matter how small, and they have received the best possible kind of education in the problems of finance and management. Now, however, with all this work in the hands of the company, that educational possibility is removed. More employees each year will not become familiar with the things they might have learned from an active participation in running this little co-operative store.

The Art in Buttons store has proceeded straight along the lines of its original development. When it was first

found necessary to hire a girl to help in selling and wrapping goods, the company did make an offer similar to that which was accepted by the employees of the automobile concern. The store seemed to the management to be an excellent institution, and its offer was made in the same spirit as that of the automobile management—a spirit of helpfulness. It was prevented, however, from making the same mistake as the other firm by the action of the Council to whom the offer was submitted. The following is quoted from the Proceedings of Session of the Council:

"The patronage of our co-operative grocery store became so large that it was impossible for our volunteer committee to efficiently handle the orders. On the recommendation of the Council a part-time paid clerk was secured for the week end rush of putting up orders.

"In connection with the above, the Council declined the corporation's offer to pay for this help, preferring to have the small expense incurred added to the price of the goods in order that our store might be truly said to be 'run by the employees.'"

The experience in business administration thus gained by the workers is very valuable in giving them an insight into the problems and difficulties which face the management in its administration of the business as a whole. It takes away, as well, the possibility of suspicion arising among the men concerning the honesty of the store administration. Both of these factors aid materially in preparing a common meeting ground of mutual confidence and understanding upon which disputes and differences can be brought and successfully thrashed out to the satisfaction of both management and employees.

Setting Standards for Personnel Administration

"CERTAINLY no more serious situation could be conceived than one in which millions of people are destined to be confined for eight or nine hours of close application, to labors which are indifferently or even grudgingly performed. . . . The permanence, productivity and humanity of any industrial system stands or falls in the last analysis upon its ability to utilize the positive and constructive impulses of all who work—upon its ability to arouse and continue the interest of the workers. The problem, therefore, demands searching study if we are to answer such inevitable questions as: Is interest in work as now carried on possible? If it is possible, how is it to be aroused? If it is not, how can we so modify conditions that interest will arise?"

The foregoing paragraph outlines the scope of a discussion of methods of arousing interest in work which comprises an interesting chapter in "Personnel Administration: Its Principles and Practice," a new McGraw-Hill book, by Ordway Tead and Henry C. Metcalf, members of the Bureau of Industrial Research. In the chapter mentioned the book reaches its greatest intellectual height. Not only are practical methods of arousing and maintaining the interest of the worker discussed, but certain fundamental psychological reactions are noted and analyzed. These are shown to be the important factors in ultimately solving the problem.

The book as a whole sets forth the principles and the best prevailing practice in the field of the administration of human relationships in industry, and covers, sometimes in more detail than others, the various phases of work of the personnel department. Health and safety, principles of industrial training, methods of practical indus-

trial research and wage systems are among the chief topics treated.

The book maintains a progressive tone throughout, pointing out the practical advantages of the best modern thought concerning every phase of industrial relations. The authors possess a thorough knowledge of the field, both from a practical and theoretical standpoint. It is on the intellectual and analytical side, however, that the book chiefly excels. It will gain higher praise from the student of industrial affairs than from the average employment manager. It is valuable rather as a guide for the chief executives of a firm in determining personnel policies than as a practical manual for the use of the man who is to install the actual mechanical phases of employment work. In brief, "Personnel Administration" fulfils its purpose more fully as regards principles than as regards practice.

In discussing the problem of foremanship, an exceptionally frank and complete analysis is made of the attitude of the foreman and the facts which color his point of view. The conclusion is reached that "unless the foreman is a remarkable fellow he is likely to be in the wrong mental attitude to deal with workers. It is not a matter for blame; the foreman is simply the victim in his own field of the rapid growth of the industrial system. His position nevertheless calls urgently for understanding and correction."

If the excellent discussion of principles embodied in this book could be supplemented by a more practical book concerning the actual methods and forms to be used in installing personnel and employment work, the literature on this subject would be much more complete than it now is. The latter phase has not yet been satisfactorily treated.

Now Is the Time to Retool the Factory

Mr. Manufacturer, are you quite sure that you are going to be able to meet competitive prices when the buyers' market is squarely presented to you? Will your labor costs be lower than before the war? They will be with some of your competitors and you must compete with them.

By J. Edward Schipper

REGARDLESS of all the other interpretations and predictions based on the period of readjustment through which we are passing, there is one fact which stands out more clearly than any other—the automobile and allied industries are coming back to the competitive stage.

Up to a few months ago, and for a period of four years, the industry has passed through a condition where demand has been greater than supply. The curtailment of production, due to war, and the resulting sales demand at war's close, made it possible to sell practically any kind of products at any kind of price, to a market which seemed as if it could not be appeased.

During that period of easy money there were two kinds of concerns:

- (1) Those who turned a good portion of their profits back into the business, and
- (2) Those whose sole ideas were momentary profits.

The former concerns are now about to gain the fruit of their far-sightedness, the others are in a position where they will have a difficult situation to meet.

A factory which has not practically retooled itself within the last three years is almost obsolete. Such a factory is going to be in a difficult position when the days of price competition are really upon us. We have not had this price competition for four years, but it is coming with the revival of business.

A study of conditions indicates that supply and demand is going to be very closely balanced from the automobile and truck manufacturers' standpoint when we have gone through the period of financial readjustment. With this balance, a concern which can turn out its product at a lower cost and can afford to sell it for less money is going to get the business. Those who cannot do so will suffer.

At present a great many factories are shut down in certain of their departments, which have produced sufficiently ahead to take care of present demand. The general condition is such that no better time could be afforded than the present for a very comprehensive study of the manufacturing conditions in the plant.

Now is the time for concerns who have not revised their tool equipment and brought it up to date to do so. It is highly important for the success of any manufacturing concern that it be ready to meet price competition, which means, in other words, the lowest possible manufacturing costs, just as soon as the tide of business turns.

We are now returning to a sane period. People who buy will "shop" more. That means the price will be more closely scanned than it has been during the past

four years. A manufacturer who sits back during this dull time, and thinks that his shop will be ready to go ahead and take care of the business as soon as sales pick up, will do well to ask himself the question:

"Am I really in a position to meet price competition?"

Machine tool design has advanced rapidly during the war period.

Is your competitor going to be better equipped from a tool standpoint than you are?

If he is, he is going to under-sell you.

To-day, many shops which, on war work, were running their machines continuously, often three shifts per day, expect this same machinery to be ready to fight their commercial battles when business is back to normal.

There has been a great amount of profit taking during the past few years. Those concerns which put a portion of this money into a reserve fund for machinery, or which purchased machinery, are going to be in the strongest possible position to take advantage of the market. It is very probable that wages will not return to their former level, even though they might drop further than they already have from a war standard.

Labor costs, however, can be reduced by proper machine equipment.

Manufacturers who have failed to keep themselves posted on the improvements in machinery adapted to their line will be surprised at the developments which have been made during even the last year. A fact which brings this out very clearly is the drop in prices on used machinery, while new machinery practically maintains its level. Not long ago, at a purchasing agents' meeting in Cleveland, it was stated that it was very possible that the machinery market would indicate a drop in prices, because of the fact that there seemed to be an extraordinary amount of used machinery on the market which was selling at exceptionally low figures.

The fact remains, however, that the demand for new machinery has been such that the price has been affected but little, if any. There are a great number of manufacturers who appreciate the necessity for now arranging their equipment for a lower production cost. This era of retooling is extremely necessary, in view of the fact that practically all of the factories have been pushed very hard during the war period and the active commercial period immediately following the armistice.

During the war and, in fact, for a considerable time after, it was impossible to get deliveries on new machinery and only a very few of the manufacturing concerns have managed to keep up-to-date in this respect. Some of the cost reductions which have been made during the last year by the installation of up-to-date manufacturing apparatus have been startling in the extreme.

It is not uncommon to find manufacturers on even large units, who, by means of better tools and better methods, have been able to increase production 200 or 300 per cent, with a 50 or 60 per cent cut in the amount of labor employed.

With this condition existing, it is easy to see how it is possible to keep the wages higher than the pre-war amount and yet have labor costs considerably lower. Conservation of man-power means more than the mere saving of wages. It means increased speed, increased accuracy, elimination of the fatigue element and greater reliability. It means lower cost and the ability to meet the market on a competitive basis.

Looking at the matter from a very broad aspect, one of the greatest sources of wealth in this country is improved machinery. The conservation of man-power is, of course, the greatest accomplishment of any nation. Further than this, it is the cause of the much lower price of manufactured articles. This puts the product within the reach of a great number of buyers, and furthermore, gives us a tremendous foothold on the export market, thereby increasing the country's prosperity because of its standing in the world's trade.

This does not necessarily mean that the manufacturer's profits are smaller, even though they should

be smaller per unit, because his business will be made up on the greater bulk of his output.

While this may sound like eventually leading to saturated markets, and, perhaps, in some industries does so, causing manufacturers to turn to other lines, the automotive field is so exceptionally well situated in respect to this that we need not look to any such thing for at least a generation, if ever. The use of the small, portable power plant is only in its infancy. With the ever increasing population of the world, more intensive farming methods must be utilized. This, of course, means motorizing. The transportation problems of the world are going to be solved largely by vehicles driven by internal combustion engines.

We are on the eve of tremendous developments in aerial transportation, and from an automobile standpoint there is certain to be an ever increasing percentage of the population which utilize these vehicles for business and recreation purposes.

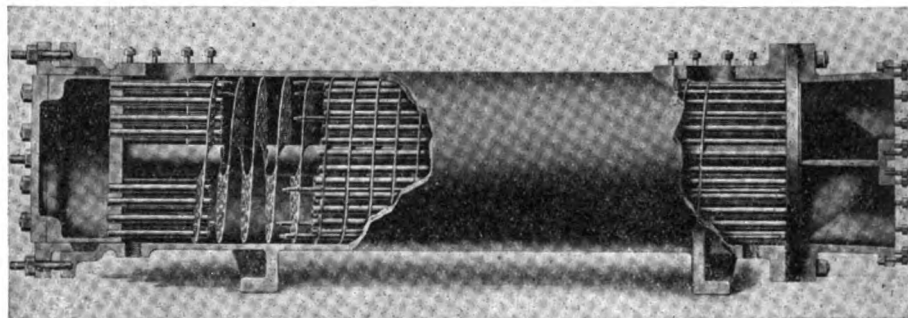
Manufacturers with the proper breadth of view in this industry are going to prosper, but it is certain that only those who are properly equipped to enter the field on a competitive basis will succeed. It is a striking fact that those concerns which have been affected least by this lull in business are the ones which are noted for their excellent tool equipment.

Multiwhirl Cooler for Cooling Quenching and Lubricating Oils

A DEVICE for cooling quenching oil in the heat treating of steel or oil used in the lubrication of turbine bearings and reduction gears is manufactured by the Griscom-Russell Co. In either case the oil is constantly circulated through the cooler, thus maintaining it at a constant temperature and permitting the continued use of the original quantity of oil and its maintenance at the proper viscosity for efficient results.

The apparatus takes its name from the whirling path of the oil, due to the use of the helical baffle which directs the oil in its flow. This baffle also serves to bring the oil into intimate contact with the cooling surface and to insure a high rate of heat transfer.

The shell is of cast iron and the tubes are of seamless drawn brass or copper, expanded into a fixed tube plate at one end and into a floating head at the other, which latter permits expansion and contraction without strain.



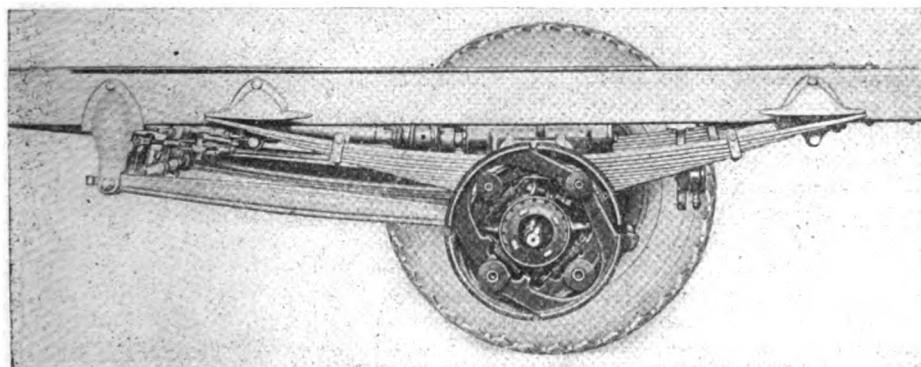
Multiwhirl cooler for quenching oil

Novel Suspension of Armleder Truck

IN a new 1-ton truck brought out by the Armleder Co., a special suspension is used whereby the half elliptic springs are automatically shortened and stiffened as the

load on the truck increases. The springs are 63½ in. long and bear with their ends against the convex surfaces of spring blocks bolted to the chassis frame. As the load increases, the line of contact between the spring and the pressure block automatically moves toward the center of the spring, thus reducing the length of the latter, until under full load the virtual length of the spring is 18 in. less than at no load. In this way the flexibility of an exceedingly long spring is combined with the strength of the short spring.

The radius rod and the rear propeller shaft are of the same length, and are mounted parallel to each other, whereby end thrust on the universal joint is eliminated and slipping of the propeller shaft prevented.



Novel Armleder chassis springs self-adjusting to load

Coolie Politics Bars Automotive Transport in East

This is a different view of the automotive export problem. It is the same problem that was fought out and solved by the farm machinery manufacturer in this country when farm labor opposed the reaper and binder. The writer indicates the bigness of the problem that is before the manufacturer who would open the greatest of fields—the Orient.

By Roy Alden

IN the great drives for trade being waged by American exporting manufacturers of automobiles, tires and kindred products, obstacles are being encountered in many sections of the world that will require systematic educational campaigns to eliminate. It is in China, Turkey, French Indo-China, Siam, India and elsewhere in the Near East and Far East—markets of immeasurable opportunities—that the educational campaigns should be centered, as it is here that human muscle is successfully resisting the motor vehicle as a mode of transportation.

While in the United States the motor truck is becoming the means of short haul transportation of everything from packages of hair pins purchased at the department store to loads of forest giants, across the oceans brawn is the chief agency of transportation. This is especially true in the Orient, where human muscle has for centuries been about the cheapest commodity money can buy.

When it is declared that the total number of motor vehicles in China and Japan combined do not exceed the number of automobiles that pass given busy corners on Fifth Avenue, New York, or State Street, Chicago, during an afternoon two-hour period, some conception of the tremendous potential demands for American automotive vehicles that exist in these two countries that hold within their confines nearly one-fourth of the population of the entire world can be gained.

These potential demands will become actual demands as soon as the Orientals are educated to an appreciation of what the motor vehicle means to their respective countries in the matter of development as well as to the individuals themselves in the betterment of their economic conditions.

A few months ago the writer visited Constantinople and there witnessed an example of how muscle, even down to the present day, has succeeded in keeping out modern methods of transportation.

In considering the *opposition of human muscle to automotive muscle*, however, several points must be taken into consideration in order to understand the situation clearly. In the Orient, flagrant ignorance of the value of motor vehicles is the chief cause why they are not used to any appreciable degree. But in the Near East, especially in Turkey, attention is drawn to an organization known as "hamals" or "porters." This organization draws its members from the motley population of the mystic Turkish city and European Turkey generally, and includes Greeks, Arabs, Bulgarians, Roumanians, Montenegrins, Turks, Egyptians, and a host of other nationalities.

The "hamals" of Turkey have acquired a tremendous influence in the business and commercial life of Turkey and they have bitterly fought the introduction of motor vehicles for purposes of transportation, not because they do not appreciate the worth of automotive transportation but because they do. They realize that if automobiles are imported to do the "carrying" they will lose their influence and their organization will crumble.

While it may seem almost inconceivable, this city of more than 1,000,000 people, which serves as the great distributing center for the upper Balkan nations and a portion of Asiatic Turkey, had virtually no trucks or commercial automobiles and not a single motor-driven, or even horse-driven, fire-fighting machine up to the time the armistice was signed. Even to-day, outside of the automobiles in military use, there is no appreciable number of motor vehicles in Turkey. *The power of the "hamals," although weakened somewhat, has not been broken.*

It is a common thing in Constantinople to walk along the main streets of the city, black with people of all nationalities, and see these "hamals" plodding along the street with immense loads on their backs. When a person goes to a furniture store, for instance, and selects a set of furniture and orders it delivered, no motor trucks back up to the rear of the furniture establishment, take on the load and make the delivery. *Not while the "hamals" continue to wield their undeniable influence.* The furniture dealer calls in some "hamals" from the district in which his place of business is located. If the pieces of furniture are light, such as chairs, they are fastened together and then roped on the back of a "hamal." If the pieces are heavy two or three or four "hamals" are employed, or possibly, but not generally, *an antiquated donkey-driven cart may be called in.*

Only if the purchaser of the furniture resides within a short radius of the store where the order was placed does the original "hamal" or "hamals" who first took on the load make the delivery direct. If the purchaser lives in another portion of Constantinople—and there are almost as many suburbs in Constantinople as there are avenues in the average American city—the load may "change backs" a half a dozen times before it is finally delivered. For instance, one "hamal" will take the load to the end of the district in which he is authorized "to carry." At this point he will transfer the load to the back of another "hamal" who enjoys "rights" in the adjoining district. And so on until the final delivery is made.

And all this, too, in a city of more than a million people in Continental Europe.

From Constantinople we penetrated to Constanza, the Black Sea port of Roumania, which is a day's run from the Turkish capital by steamer. Here are seen sacks of flour being swung from American steamers that were sent with their cargoes of food from the United States to relieve the acute situation. The flour is swung from steamer hold onto a quay. As there were virtually no covered docks the flour had to be transported a considerable distance to shelter. How was it transported? *On the backs of men!* Literally thousands upon thousands of sacks that made up the great cargoes were lifted one by one onto the backs of the Roumanian peasants, who trod wearily for blocks to the sheds to deposit their loads.

Unloading of the ships and placing of their cargoes in the sheds or warehouses that could have been accomplished with modern freight-handling facilities and motor trucks in two or three days required weeks. In justice to the Roumanians, however, it should be declared that the reason motor vehicles are not used extensively in that country is due more to a lack of initiative, energy and appreciation of automotive machines rather than a firm, selfish desire to adhere to antiquated ways.

The crying need for an educational campaign becomes emphasized. Facts, not flowery descriptive matter, need to be laid before this people. They must be told that motor trucks and commercial vehicles perform so much work in so much time at so much cost, as opposed to what human muscle performs.

It is difficult for Americans, living as we do in a whirlpool of automotive energy, to appreciate how antiquity still successfully opposes modernity in other climes. Reverting to the "hamals" of Turkey, we find them not only controlling the transportation system ashore and preventing the introduction of motor vehicles in any substantial numbers, *but they are found holding a powerful influence over the entire life of the city.* They are largely responsible for the fact that Constantinople, a port that in natural advantages has few equals in any other part of the world, *there is not a single dock to handle ocean-going vessels.*

All cargoes must be loaded or unloaded in the Bosphorus from or to lighters. And this, too, despite the fact that the Bosphorus is so deep that the largest vessels afloat can tie up alongside of almost any part of the European or Asiatic side of the famous waterway.

Lightermen and stevedores compose that species of "hamals" known as "porters." Just as their fellow foes of progress have a firm hold on affairs on terra firma, *so have the "porters" a strong hold on affairs afloat.* The material advantages that accrue to these "porters" by preventing the introduction of modern facilities is easy to appreciate. *All shipping is absolutely dependent upon their will.* Ships must bow to their will as to the length of time they will remain anchored in the harbor before their commercial missions are completed.

The ship on which the writer obtained passage waited nine days to take on a small cargo of tobacco, hides, Bulgarian opium, licorice, rugs and other articles that could have been loaded in less than a day in an American city with mechanical muscle.

Proceeding further east to the Far East similar conditions are found as regards the motor vehicle. In China, Japan, Indo-China, Federated Malay States and in other countries, colonies and dependencies in the Far East, there is hardly anything that can be acquired more cheaply than coolie muscle. Turned into American equivalents, *a coolie can be had all day for 20 or 30 cents.*

While it is not generally appreciated in this country, there is a movement on foot throughout the Far East that is of great significance and which will ultimately mean much to the American exporter of motor vehicles.

The movement is sponsored by the members of that great army of coolie laborers from China, French Indo-China and Malaya who went to France and worked behind the lines of the Allies. These thousands of members of the yellow race, after having passed through Canada, are now home again in their native soil. These returned soldiers of the Orient are different men than the soldiers that left China's shores years ago to answer the call to war. They have gained a wider perspective.

They have come to the realization that in other parts of the world human muscle takes a back seat to mechanical and motor muscle. They have breathed in an atmosphere of twentieth-century energy. And their eyes have set their cobwebby minds to thinking and an organization of returned Chinese soldiers has now been effected.

Keen observers of the situation in China, with its 400,000,000 people, declare that a new era has dawned in which the returned Chinese coolies are playing a highly important role. If cheap coolie labor can be eliminated in China—if the millions now engaged in carrying can be turned to production and constructive work and mechanical and automotive muscle replaces human muscle, China unquestionably will become one of the world's greatest nations.

And this movement, from the viewpoint of possibilities in foreign trade, holds greater opportunities to the American exporting manufacturer of motor vehicles than to the exporter of any other manufactured products. That the time is coming when motor trucks and delivery cars will do the work that is now being done on the backs of man is the conclusion of those who have watched the New Spirit of China.

American manufacturers of motor vehicles overlooked a great opportunity to hasten the acceptance of modernity by the great Chinese Republic when that great army of coolie laborers were hurried through Canada from France on their way home. While it may have been an unwieldy undertaking, there is no question but that there would have been remarkable results if these coolies were taken on a tour of some of America's leading industrial centers and shown how things are done in this day and age in a developed country. True, these coolies saw much and absorbed much during their term away from their native soil, but they should have been given an opportunity to have seen more.

It is not necessarily the leaders of business and commerce in China, Japan and other countries in the Far East that the Americans want to cater to in developing these countries as fertile markets for the motor vehicle. *Quite to the contrary, it is labor they must seek and educate, especially in China.* These are the persons who, by the cheapness of their muscle, are fighting the automobile. And, irrespective of what rising wages may mean in countries such as the United States, there can be no hesitancy in acclaiming the general advance in the cost of human muscle now taking place in the Orient.

A TEST recently made at McCook Field on Monel metal valves in a Liberty single cylinder engine tended to show that this metal is not satisfactory for airplane engine valves. In the tests the Monel metal exhaust valve failed at the end of 16 hours' running, the cause of the failure being excessive heat and mechanical stress on the exhaust side.

Effective Study of Aviation Hazards Begun

Preliminary reports by the Committee on Aviation Hazards of the National Safety Council outline definitely lines of study to be followed. Facts presented are of exceptional interest, since they embody the first comprehensive study of aviation hazards applied to civil as well as military flying.

THE future of commercial aviation depends, to a large extent, upon how safe flying can be made. The majority of people must become convinced of the comparative safety of air travel before they will utilize it as an every-day means of transportation.

Because the factor of safety is so important, special interest attaches to the work of the Committee on Aviation Hazards of the National Safety Council. The work of this committee comprises not only the compilation of accurate flying safety statistics compiled from past performances, but also the classification of the various types of accidents, the finding of their causes and the determination of means for eliminating them.

The committee was first appointed in May, 1919. Its efforts thus far have resulted chiefly in laying out very definitely the lines of activity which its work should follow, determining what factors of its task are most essential, and planning the best means of accomplishing the desired ends. This preliminary work is a stupendous task in itself since the field in which the committee functions is absolutely virgin soil; it contains practically no accurate guide posts by which the work may be directed.

Two reports have thus far been made by the first chairman of the committee, Frederick L. Hoffman, third vice-president and statistician of the Prudential Insurance Company of America. These reports are of exceptional interest, embodying as they do, the beginnings of the first important study of aviation hazards in this country as broadly applied to civil and commercial as well as military flying.

The first report begins with a statement of the problems and the natural divisions into which it falls.

"The subject divides itself, broadly, into (1) aviation for military and (2) aviation for commercial or private purposes. It is of the utmost importance that from the outset we secure the hearty co-operation of the government." Detailed suggestions follow concerning the civil and governmental agencies which should be consulted and asked to recommend men from their particular departments to serve on the committee. These agencies include:

1. Director of Military Aeronautics, U. S. Army.
2. Director of Naval Branch of Aviation.
3. Chairman, National Advisory Committee for Aeronautics.
4. Manufacturers' Aircraft Association.
5. Vice-president and general manager, Curtiss Aeroplane Co.
6. President, Dayton-Wright Aeroplane Co.

The report continues: "The questions the committee will have to deal with resolve themselves into:

1. A determining of the actual hazard in flying or degree of risk, comparable with occupational exposure in other dangerous employments.

2. The ascertainment of the causes or conditions responsible for accidents in aviation, whether fatal or non-fatal, as the case may be.
3. The prevention of such accidents in the light of all the knowledge now extant on the subject, both as concerns the plane or machine operated and the operators themselves."

The report then quotes from a treatise on the Air Medical Service as follows: "Flying itself is now just as prosaic and commonplace as riding in a motor car and not more dangerous. To consider that an aviator at the front is in greater danger than his brother in the trenches is ridiculous. Actual statistics prove that it is far safer in the air!"

In this connection the opinion of the chairman expressed recently in a letter to AUTOMOTIVE INDUSTRIES is of particular interest. "The matter (aviation hazards) is greatly in need of much more extended consideration if serious public apprehensions are to be avoided. You may have seen recent discussions as to the true rate of accident frequency in aviation, leading to totally different conclusions than the easy-going methods of the War Department as exhibited at least in the Air Medical Service."

The report itself contains suggestive statistics concerning flying safety gathered from different sources.

Special emphasis is laid upon the necessity for properly training pilots and for choosing proper pilots to begin with. This is regarded as one of the most important factors making for safety in flying. In one place the report says:

"Special care and attention are necessary in the selection of men for aviation service and it is, therefore, to be hoped that the committee will include at least one representative of Air Medical Service, so that all the essential facts bearing upon this aspect of the problem may be brought before the committee as a whole."

In the second report this point is emphasized again:

"As a question of the first importance, I would suggest for prompt consideration the whole problem of the qualified examination of civil aviators in accordance with the methods described in considerable detail by R. A. Bachmann, Surgeon U. S. Army, in the U. S. Naval Medical Bulletin. A reading of this publication, of which copies will be obtained for the information of the committee, indicates the urgency of thoroughly qualified examinations, it being well said that 'flying is a new science and new faculties are brought into play, the soundness of which must be determined in the applicant. In addition to physical fitness, the emotional apparatus must be tested.'"

The first report concludes as follows:

"The foregoing preliminary report will indicate in broad outlines the plan and scope of the work of the committee. If carried through with the required energy

and ability, the results should prove of a far-reaching value, not only to the public at large and in the furtherance of the development of commercial aviation, but also to the government in the perfection of the Air Service for military purposes. I, therefore, should make every effort to secure a thoroughly representative committee which, if it is desired, may choose its own new chairman, if my lack of technical qualifications should preclude adequate attention to the work."

Aside from the matter of proper selection of aviators, the chief recommendations of the second report are:

1. "The committee should leave nothing undone to develop sound ideas of aviation practice as a profession, and to discourage by all means the lamentable tendency to the needless assumption of serious risks.

2. "There should be a sub-committee on meteorology. Recent aviation experience has brought out more than ever the great practical importance of a full understanding of atmospheric conditions, laws of storms, etc.

3. "One of the most serious problems is efficiency of motive power. The best motor may prove unreliable.

4. "How far it would be possible to employ special safety precautions for both aviators and passengers is, of course, as yet an open question.... Suggestions are receiving an increasing amount of attention but evidently the subject is one of highly specialized consideration. A multitude of matters will require the attention of the sub-committee on safety in aviation but the work of such a committee should prove of the greatest possible value to those who wish to bring about an increasing sense of security in flying on the part of the general public.

5. "Concerning the practice of life insurance, which is, generally speaking, adverse to the acceptance of professional aviators except at practically prohibitive extra premium rates, it may be stated in this connection that thirty-one large British insurance companies have formed a pool known as the 'Aircraft Insurance Committee' with offices at 4 Thomas House, Queen St. Pl., E.A., London. Under the scheme worked out manufacturers will be able to effect insurance against the following risks:

- a—Damage to machines from any cause.
- b—Accidents to passengers and pilots.
- c—Loss of or damage to goods in transit.
- d—Liability of injury to the public or damage to public property.

The companies referred to transact chiefly accident liability insurance. It is hoped that an opportunity will present itself to the chairman to consider this matter during his forthcoming visit to England, and if possible, additional and official information will be secured and communicated to the members of the committee.

6. "There should be a sub-committee on public accidents, or accidents to passengers and bystanders. Without insisting upon unnecessary restrictions or rules and regulations, it would nevertheless seem a first duty of such a committee to inquire thoroughly into the whole question of safety precautions, chiefly for the protection of passengers as well as bystanders likely to suffer most from the hazard of inexperience and even reckless adventure.

7. "In conclusion, the question may be raised whether there should not be a sub-committee on the requirements of aeronautic instruments and the possible necessity for the compulsory use of wireless telegraphy on airplanes, dirigible balloons, etc., making long distance flights. This being a highly technical problem, someone recommended by the National Advisory Committee for Aeronautics should be invited to assume the chairmanship of a sub-committee on this particular subject, if it is decided to be called for by need of adequate protection of the public."

In furtherance of its plans, the original committee sent

out letters of invitation to a number of representative experts connected with aviation interests. The essential portion of the letter reads:

"Upon preliminary consideration, we have agreed to divide the general industry into:

1. Accident liability of operators; due to
 - a—Lack of proper training; inexperience or want of skill; and, a disregard to the suggestions disclosed by the Air Medical Service; and
 - b—Recklessness or foolhardiness.
2. Accident liability resulting from defects in machine construction; due to
 - a—Faulty technique of manufacture;
 - b—Neglect of proper repairs or attention to weak points in construction;
 - c—Defects of motor power; faulty engine construction, etc.
3. Accident liability of passengers, due to
 - a—Improper care, seating arrangements, etc.; or
 - b—Want of physical adaptation to variations in altitude which would require a due consideration of questions of altitude physiology.
4. Accident liability of the operators and mechanics on the ground; due to
 - a—Disregard of proper safety precautions, both concerning the operator and the bystander.
5. Accident liability; due to
 - a—Inherent natural causes such as unusual weather conditions, want of knowledge of air variations, etc.;
 - b—Neglect of the use of the radio apparatus, etc.
6. Accident liability resulting from general causes, not covered by the foregoing enumeration, including the tendency to foolhardiness and recklessness as best illustrated by the recent phenomenon of 'an example of how fliers risk their lives to thrill crowds' in which Lieutenants Elliot and Short were reported to have done 'some sky vaudeville to amuse thousands of spectators at Sheepshead Bay.'

"This division of the work should include the neglect to employ safety precautions such as the use of parachutes, etc., and the neglect of exceptional precautions in the case of unusual altitude flights."

Replies to these communications indicate that the fullest co-operation will be accorded in each case.

The preceding digest of this important report reviews only briefly some of the salient points likely to be of most interest to the automotive industry. The full text of the report will be available in the Annual Proceedings of the National Safety Council about March, 1921.

THE Danish Air Traffic Co., after protracted preparatory work, was able to start regular traffic recently, the Danish Ministry of Public Works having sanctioned the conditions of the program. The commencement was made with a Friedrichshafen machine, starting from the seaplane station of the Royal Dockyard, Copenhagen, and the first route to be worked is Copenhagen-Berlin, with an intermediate stoppage at Malmo, Sweden, and a change at Warnemünde to the aeroplane for Berlin. The fare per passenger is 400 kr. from Copenhagen to Warnemünde. Until the route Copenhagen-London is opened there will also be a change at Warnemünde for Hamburg. The Copenhagen-London route will be opened shortly and four De Havilland machines, which are expected to arrive from England in the near future, are intended for this traffic, going as far as Hamburg. On the Copenhagen-Berlin route some five seaplanes are engaged and flights will be made daily whether passengers travel or not.

Factory Service Managers Admit an Obligation to Owner

The service problem appears to be practically settled in many factories, as in a recent convention many managers let it be known that the satisfied owner is the objective of their work. Move to make tool rolls of some use to owner. Uniform size instruction books for cars, parts and accessories.

By J. Howard Pile*

WITH a realization that service to the car and truck owner is going to play a very important part in sales, factory service managers met in convention at the Hotel Cleveland, Cleveland, for the third time since the conclusion of the war and discussed problems relating to training, education, distribution of parts and better co-operation from the factory service department down to the sub-dealer.

The thought that seemed to be uppermost in the minds of all was that the owner must be satisfied and that it was of little consequence what methods or systems are used as long as the results are satisfactory.

The first two days of the convention were given over to business sessions and the third day to visits to local factories and service departments.

A. B. Cumber, General Service Manager of the Auto-car Co., was chairman of the meetings and H. R. Cobleigh, Service Secretary of the National Automobile Chamber of Commerce, handled the business of the meeting.

The outstanding feature of all the talks was that the factory had a real responsibility in service to the owner, even though the factory does not enter directly into it. It can no longer be said that the distributor, dealer or sub-dealer is responsible because he gets part of the discount, because if these agencies fall down on the job, the owner is dissatisfied and sales will fall down. It therefore becomes the duty of the factory service department to see that the right kind of service is given, handling this preferably through the distributor rather than directly with the agency at fault. Special tools, policies affecting the distribution of parts for components and accessories, maximum and minimum stocks and training of personnel all assist the direct service agencies and were the principal topics of discussion.

In his opening address George C. Hubbs, vice-president of the Grant Motor Car Co., said that treating the car owners and car drivers with courtesy was of greater importance even than correctly repairing the cars. He was of the opinion that there was more dissatisfaction with service because the owner was not properly sold than there was with real complaints about poor quality work.

Hubbs said that the average service manager was more involved with systems than with the actual education of the owners and of the mechanics in his employ. He was of the opinion that the service manager should be an assistant both to the sales manager and to the chief engineer. The service manager should be capable of formu-

lating policies of such magnitude that even the policies of the smallest dealer would be an exact reflection of the policies of the factory.

The attention of the delegates was called to the constantly increasing traffic, especially in the large centers, and it was suggested that the convention take some action on the uniform traffic signals which have already been approved by other national organizations. The uniform signals are:

Hand below horizontal, turn to left.

Hand horizontal, stop or caution.

Hand above horizontal, turn to right.

By a vote the convention decided to adopt this code and to use every means to extend its use.

F. J. Wells, Service Manager of the Pierce-Arrow Motor Car Co., spoke on the training of men for executive positions in local service departments. He said that his firm was training about 50 such men a year and that the results had been very satisfactory. These positions range from service managers down to foremen and the cost to educate a foreman runs around \$700. He said that about 85 per cent of the men so trained stayed with Pierce-Arrow.

G. W. C. Braithwaite, service manager of the Apperson Bros. Automobile Co., read a paper entitled "How to Improve Passenger Car Service," in which he pointed out a number of instances in which he, on a trip, had been unable to get either the parts that he wanted or the service that he needed from local service stations. He pointed out that while it was highly desirable to give all possible assistance to authorized service stations, yet it was quite impossible to have these so widely distributed that the owner would be near one if he needed service. He said that most owners were inconsiderate enough to break down a good distance from an authorized service station and therefore the independent garage was called on to perform the work. As it has not generally been the custom in the past to take any notice of the garage, the parts are not usually at hand and the garage does not know how to perform the work sometimes.

Braithwaite praised the automobile business papers for the assistance they had been to these independent repair men in furnishing information when the factories did not seem to be alive to the possibilities of co-operation.

L. C. Voyles of the Marmon said that service must be put on a merchandising basis. He said that if you went into a store to buy a hat, the salesman stepped out with a smile and tried his best to sell the hat, his service and

*Technical Editor *Motor World*.

the reputation of his house, but when a man came in with a car to be fixed too often the service salesman sauntered down with an air of "What in the hell are you doing around here again?"

The question of service hours was brought up, it having been suggested that automotive vehicles are in direct competition with steam and electric trains which render a 24-hour service, and it was therefore almost a necessity to give this same kind of service to the car and truck owner because he is using his vehicle considerably over the 8-hour period.

Paul Williams, Service Manager of the H. H. Franklin Mfg. Co., said that a considerable problem in the past had been the preparation of special tools for repair work. Ten months ago his company had engaged a tool maker, who is devoting his time exclusively to this problem. The tools have been carefully worked out in practice, and Williams estimates that a full set, aside from the engine running-in stand, should cost about \$100.

Discussion on this paper brought out the statement that the tool rolls supplied with most cars are almost worthless, that the wrenches do not fit the bolts and nuts and in general the tools are of poor quality. This was generally agreed to, although some said that the trouble had been remedied by asking officials of the company to try to use the tools.

There seems to have been a considerable change of mind in the matter of responsibility in connection with parts and service for parts and accessories not covered by the factory warranty. It had been previously held that the manufacturer of the part was responsible for both the parts and the service.

Now, however, with the satisfaction of the car owner more to the front, the managers generally agreed that the car or truck service departments should take care of the owner unless the parts manufacturer had better facilities at hand to give the owner better service.

Instruction and parts books came in for a lot of criticism and discussion. Some were not in favor of furnishing parts price lists to the owner, others contrary. With the constantly increasing number of parts and instruction books issued by component and accessory manufacturers, it becomes increasingly difficult for the owner to keep these together.

It was therefore agreed that in future instruction books there should be a uniform size of 6 x 9 in., and that a committee should be appointed to meet with a committee of the Motor and Accessory Manufacturers' Association to see if the accessory makers would also conform to this size, and then the books could all be punched and bound together in loose-leaf form.

Stolen cars and their relation to the service department was ably handled by E. L. Ricards, manager of the Western Automobile Underwriters' Conference, who said that one of the greatest difficulties that his organization had to contend with was the impossibility of identifying cars after the serial number had been altered. He said that in many cases the numbers on the components remained unaltered, but the factory assembly records were not arranged so that, knowing the number of any part, the serial number could be ascertained. Secret numbers and cross references for parts numbers were suggested as a relief for this situation, and it was pointed out that this would be of great value to the car owner and therefore a sales argument. He also said that in the new ratings now being made up a reduction in premium would be allowed on cars which could be identified in this way.

Buffalo has been selected as the next convention city and the time of the convention was set for May. It was decided to have this a closed meeting for factory service managers, but provision has been made to accommodate a few who are not in this class but interested in the work.

Bad Garage Service in the United Kingdom

LONDON, Oct. 29.

JUST now there is an outcry in the *Harmsworth Times* and *Daily Mail* concerning poor garage service in England, though probably the rest of the United Kingdom is meant to be included. The complaints may be cited as follows: Dirty and ill-equipped premises; slovenly, careless and indifferent service; overcharging and a general lack of business oversight.

The most serious aspect of these complaints is that they are leveled specially at the garage "mechanics," the men who might be supposed to have benefited by war training, etc. But this class is roundly being blamed in all sections of industry, some regarding it as revolutionary and prone to idleness. As regards the immediate issue, two other factors are to be noted:

1. The effect of Ford service is beginning to be realized and noted in this country, Fords having insisted on, and being in, an unchallengeable position to compel their dealers even to build and equip separate premises and carry stocks, and otherwise to conform to the company's service ideals. Other American firms are tentatively following suit, but of course they are very few and their sales are not sufficient to set up the exacting standards of Ford.

A few British car makers have traveling inspectors who periodically visit customers and examine and report on their cars and indirectly are able to note the quality of local garage service. This sort of manufacturer ser-

vice at present is limited to the more expensive makes of cars, but seems likely to develop if only as an antidote to American enterprise in our midst.

2. To blame the garages and garage "mechanics" is not fair unless the manufacturers also are included in the survey, e.g.:

(a) As regards the uncommercial designs of some makes which are not suitable for ordinary mechanics to deal with—and this remark applies more to the cheaper cars of the sort mostly owner-driven, and

(b) A lack of really useful instruction books which would enable any mechanic to grasp the layout of (to him) unfamiliar cars, and

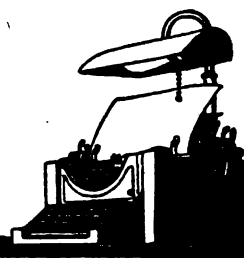
(c) Lack of standardization is a factor responsible for very much unnecessary delay on various scores.

The most that can be expected from a country garage is "service" by way of clean accommodation for cars, facilities for small repairs to, and changing of tires and wheels or rims, gasoline and oil supplies and ability to cope with some small breakdown such as done by blacksmiths in the case of farm implements, etc.

The attention of the dealers' organization—the Motor Trade Association—is being constantly called to this need, but it seems likely that it will only be satisfied by the two associations of motorists—the Royal Automobile Club and the A. A.—both of which have well filled coffers—taking up the issue and seeing it through. Meanwhile Ford is reaping a harvest on this as on other scores.



The FORUM



Prosperity and the Patent Office

Editor AUTOMOTIVE INDUSTRIES:

Except for the uplifting influence of our badly starved churches and schools; and except for the great natural wealth of water and woods, field and mine—wealth beyond that of any other nation, inequitably distributed though it is; no one thing has contributed so much to the wonderful progress of our land and to its influence on the world during the last century as has our Patent Office.

Our liberal patent laws have held before every one the promise of a reward for every development of value, and no taxes have destroyed this promise, as happens in foreign lands. As a result, the inventions of American inventors have broken all records both in number and value. No other nation can point to so many epoch-making devices. Originated here, they are too often developed elsewhere and now are adding wealth to all nations often without credit to the original inventor. Further our Patent Office is the only Government Department that is more than self supporting and it to-day has nearly \$10,000,000 of earnings taken for services not fully rendered and held by the United States Treasury only to be used by appropriation of Congress.

For a generation every Commissioner of Patents has begged that some of this money might be used to furnish better quarters, more just salaries and improvements demanded by conditions not easily told. Except in providing a more equitable and elastic money system, there is no place where a slight intelligent action by Congress can produce so great advantage and every business man, whether employer or employed, is interested in seeing the needed action taken.

"Better Patent Service" should be the slogan and a more certain reward for invention its object. The present building is far too small for the business which has grown by leaps and bounds. From garret to cellar it is crowded with people and papers. Workers and their desks bump against each other. Ill-lighted, ill-ventilated and unsanitary is a mild characterization of the conditions. Wooden shelving lines the walls; wooden cases fill the open spaces and all are crowded to overflowing with copies of patents. On these dust gathers until the remedy would seem to be an application to the Board of Health. Can it be otherwise? Go and see.

Twice the Patent Office has suffered from fire and to-day it stands a perfect invitation to another and more disastrous conflagration. The loss to the land would be incalculable. Yet the great majority of our people imagine that the matter only concerns "a lot of inventors who are mostly crazy anyhow." And Congress, reflecting the views of the voters, spends our money in junket trips to the Orient and other ways of slight value to us.

Next consider the workers there. The salaries paid are so inadequate that the minute a man becomes really efficient he is offered far more by some corporation or can make more by becoming a patent solicitor for himself. Only altruistic self sacrifice, as shown by our preachers, and teachers, and love of the work holds the better men. The empty places are filled as fast as possible by bright

young college graduates, well meaning but lacking in experience and too often unable to grasp the advances made by the brainy men who constitute our inventors. The result is defective patents, and great increase in legal suits to get justice.

Finally nearly one-third of our patents are out of print and copies cannot be obtained by business men needing them. These things can be and should be promptly remedied. This is the time to stimulate invention and make more business. The welfare of our land demands it. More certain rewards should be offered the inventor and the best of facilities should be offered him to protect that which he dedicates to the public. Congress will act if the people demand it. Now is the time.

CHARLES E. DURYEA.

Cam Arrangements of Radial Aviation Engines

Editor AUTOMOTIVE INDUSTRIES:

In the interesting description of the Cosmos nine-cylinder radial engine, which appeared in the Engineering Issue of AUTOMOTIVE INDUSTRIES dated June 10, 1920, it was stated that there were three cams on a single plate for operating the inlet valves, and a similar arrangement for operating the exhaust valves. Now, if this were the case, the valves of cylinders Nos. 1, 4 and 7 would all open at once, and so this arrangement would not be successful. In the drawing there are four inlet and four exhaust cams. Radial engines of the nine-cylinder four-cycle type fire 1, 3, 5, 7, 9, 2, 4, 6, 8. The crank turns through 80 deg. between explosions. If a cam plate having four points were used, this should travel 10 deg. while the crank pin was traveling 80 deg. (in the opposite direction) or one-eighth as fast. In the description it was said that the plates were driven at one-sixth engine speed.

Another arrangement would be to have a five-point cam running at one-tenth engine speed in the same direction as the crankshaft. As the points are 72 deg. apart, the cam must travel 8 deg. while the crank pin is traveling 80 deg., or one-tenth as fast. If the tappets for the inlet valves are staggered, and not in the same plane, other arrangements are possible.

If a circle is drawn having nine radial lines equally spaced to represent the cylinders, the correct cam arrangements may be easily determined by the use of figures of cams, with different numbers of points, cut out of pasteboard. The cam should revolve upon a pin stuck into the center of the circle. It must be remembered that the engine fires every 80 deg. and not every 40 deg. It will be found that 2-point, 3-point, and 6-point cams cannot be used.

In the case of three-cylinder radial engines a 2-point cam running at one-fourth engine speed in the same direction as the crankshaft may be used. For five-cylinder engines (explosions every 144 deg.) a 3-point cam plate running at one-sixth crankshaft speed in the same direction may be employed; or a 2-point cam running at one-fourth crankshaft speed in the opposite direction may be

used. If a 4-point cam is used cylinder No. 2 would fire before No. 3, if the cam ran in the opposite direction as the crankshaft. When cam plates having a large number of points are used, the reduction must be very great, requiring complicated distribution gearing. Also, the expense of making the cam is greater.

DONOVAN E. SHUMARD.

Chassis-Testing Dynamometers

Editor, AUTOMOTIVE INDUSTRIES:

In the October 28th issue of AUTOMOTIVE INDUSTRIES an illustration is shown of a Hispano-Suiza chassis in test with Froude brakes, and the statement is made that this installation is the only one of its kind in France and the second to be delivered to an automobile manufacturer, the first having gone to the Daimler Co. at Coventry.

This may be the first installation in Europe of a chassis test system using brakes connected with the rear

wheels, but it is by no means the first installation of a mechanical chassis test system employing dynamometers.

Electric cradle dynamometers, driven from the rear axles by silent chains, were installed by the Cadillac Co., in Detroit, in 1912, and are in daily use at the present time. This installation has been followed by many others.

As far back as 1914, a water-brake installation not unlike that shown in the drawing, but arranged for chain drive instead of direct coupling, was in use by Cole in Indianapolis.

Preparations are now being made to install an electric chassis test dynamometer system by one of the big British firms.

C. F. SCOTT.

(The first chassis testing dynamometer in this country was installed at the A. C. A. clubhouse, New York, in 1907. Somewhat later such testing plants were installed at the Worcester Polytechnic Institute. The Speedwell Motor Car Co. of Dayton, Ohio, was one of the first concerns to install chassis testing sets.—Editor.)

Duesenberg Car Has "Straight Eight" Engine

(Continued from page 1009)

doubtedly due to the difficulty of designing a simple and efficient mechanism for conveying the brake actuating motion to the pivoted front wheel brakes. Duesenberg has gotten around this difficulty by adopting an hydraulic system of actuation. These brakes are foot-actuated, in accordance with the regular practice, but the motion of the brake pedal, instead of being transmitted to the brakes by a direct mechanical linkage, is transmitted by columns of oil under pressure.

It may be of interest to point out in this connection that a similar system of transmitting motion was successfully used in the C. C. or Canstantinesco machine gun actuating mechanism during the war. On the main cross member, at the middle of the chassis, a master cylinder is provided containing a leather cup type of piston, the space behind which is filled with oil. This master cylinder is pivoted to the frame at its closed end, and the piston rod connects through a link with a frame bracket below the cylinder. From the pivot joint between the piston rod and the link a short rod extends forward to the brake pedal, the arrangement of this link mechanism being such that a toggle effect is produced when the brake pedal is depressed.

From the closed end of the master cylinder, oil distributing lines extend to the brakes at the four wheels, these lines consisting partly of seamless steel tubing and partly of flexible tubing. The lines to the rear brakes extend most of the way along the diagonal brace rods of the rear axle, and are therefore inconspicuous and well supported. The lines to the front wheel brakes extend for a certain distance along the frame side members, and the rest of the distance parallel with the front springs, which location affords a certain amount of protection to the lines. The latter part of the oil leads to the front wheel brakes, is machined in the axle end forging, and there is a swivel pipe connection at the upper end of these forgings, which does away with the necessity for exposed flexible tubing.

The general arrangement of the hydraulically operated brake is quite clear from the accompanying illustration. The brake drums, which are 15 in. in diameter, with an effective width of $2\frac{1}{4}$ in., are made by the rolling process and are cut with cooling ribs on the outside, in accordance with a custom that originated in racing practice. The brakes are of the expanding type, and the two sectors are pivoted on a stud projecting laterally from a post or

column extending down from the axle end forging. The upper ends of these brake sectors are connected together by the hydraulic cylinder and piston combination. As the hydraulic cylinder of the brake has a slight motion relative to the steering knuckle, it is necessary to use a flexible tube of sufficient length to prevent undue strain by bending in applying the brakes. The motion of the free end of this flexible tubing is the same for the front and rear brakes and does not exceed $\frac{1}{4}$ in. The brakes, of course, are fully enclosed. The oil is conducted through the steering pivot which it leaves through the swivel joint on top, then through a bent piece of steel tubing to a fitting secured to the side of the knuckle, and thence up to the hydraulic cylinder through the flexible tube.

When pressure is applied to the brake pedal, oil is forced from the master cylinder through the pipe lines to all four brake cylinders, and the brake sectors are applied to the internal surfaces of the brake drums with great force. As soon as the pressure on the brake pedal is released, the return springs withdraw the brake sectors from the brake drum. This hydraulic system for the transmission of brake actuating pressure not only does away with a multitude of links and levers, but also equally distributes the braking work between the four brakes.

In addition to the hydraulically actuated service brakes, there is an emergency brake which is mounted on the front end of the propeller shaft, rather than on the rear end of the transmission, and therefore relieves the fabric universal joints of the braking strain.

The new Duesenberg straight eight has a wheelbase of 134 in. and when fitted with a 4 or 5 passenger aluminum body weighs in the neighborhood of 3100 lb. Special pains have been taken in the design to keep the weight of the complete car as low as possible, and aluminum parts are used very extensively. Thus, the dash and the foot board are aluminum castings, as is the radiator shell. In the model shown at the Salon there is no continuous runningboard, but instead there are cast aluminum steps at the front and rear doors. The fender irons, which also support the headlights, are made of sheet steel, the headlight brackets being tied together by a tubular tie rod in such a manner as to practically remove all strain from the headlight shells. The wheel equipment is Rudge-Whitworth, with $33 \times 4\frac{1}{2}$ in. oversize cord tires.

A Definition of "Open Shop" Necessary for Present Discussion

Many manufacturers and labor leaders are to-day discussing the "open shop" tendency, but their public utterances indicate that not all are agreed as to what they have in mind. In this article a definition is offered that may eliminate some of the fighting spirit and misunderstanding prevalent

By Harry Tipper

THERE are evidences of a movement in manufacturing circles toward what is being termed the open shop, and this movement is having encouragement from a great many thoughtful manufacturers, who are disturbed by the actions of labor organizations and see no hope of a solution through their activities.

Before this movement gets very far under way it would be well for the term to be defined so that not only the manufacturers in general, but the public and the worker will understand what is meant by the open shop.

This term does not have the same meaning in the minds of different men. In the minds of many workers, and some manufacturers also, an open shop simply means a factory where the non-union man is welcomed and the union man is ostracized. In the minds of a good many workers, and in the minds of a good many manufacturers, the term open shop means a shop which does not recognize the union organizations at all, but which in other respects is closed.

The use of this term in recent speeches by many men of different habits of mind indicates again the general tendency we have to label a thing without defining that which we are labeling and therefore confining the label to the exact proposition we are talking about. There is no doubt that the labor union as it is at present constituted, is incapable of solving the present industrial difficulties, and in some respects under certain types of leadership, it is likely to perpetuate the differences instead of solving them. It is also true that strict justice demands that any worker who is competent in performing the work for which he is hired has a right to the opportunities of work without respect to his affiliations or his individual influence toward labor organizations.

In a good many of the statements which have been made, however, the inference is that the open shop is a back-fire against the growth of unionism, and is justified as such.

It would be very unfortunate to have this spirit enter into the controversies and the action, because it would destroy the true value and the possibilities of the open shop and would militate against many of the wise experiments which are being conducted in the endeavor to increase the co-operative unit in the establishment.

The manufacturer says truly, that the labor union should not be permitted to coerce the worker into joining a union by demanding the closing of the factory doors to all men who are not members thereto.

It will not aid the solution of the matter, however, if the worker is permitted to get the idea that the open shop movement is a coercion against the union with no

more freedom of action for the worker and with a larger element of control by the manufacturer. It must be remembered that a very large percentage of the workers who are members of unions are reasonably sane men who do not agree with the actions of the unions by any means at all times, and who resent the autocratic control and coercive spirit which characterizes many of the unions in their development and their practice.

To these men as to all other workers, an open shop development founded on a greater measure of justice than the unions have ever conceived, founded upon square dealing between employer and employee without respect to their personal ideas, their outside affiliations or their racial inheritance; a shop open not only to all workers, but open and above board in its decent consideration of the worker about his wages, the conditions of his work and the rules and regulations under which he must work—such an open shop would be a step far in advance in the solution of the present industrial difficulties and the establishment of the factory as a truly co-operative unit working out the problems of its own necessities.

A shop of this kind will find its adherents coming from the ranks of the unions in greater proportions than they come from the ranks outside of the unions. No union will ever be able to catch up to this kind of a shop, because it would be so far ahead of the unions in its conception of justice and its operations of the square deal that the union would be incapable of advancing to the same point.

Unless the open shop policy is to mean this sort of development, however, it will be futile except as a temporary measure and it will ultimately fail as an element in the permanent solution of the problem.

Labor leaders, walking delegates, young restless workers, intelligent and discontented workers of all kinds and natural organizers will not see the labor unions or other labor organizations eliminated from their shop control without the utmost attempt to hold them in line and await a more favorable opportunity.

That labor leaders are ready to sense these things is indicated by the following quotation from a union president to the members of his organization:

"This is not the time to listen to anyone who advocates hasty, intemperate or ill-considered action, for the factories will not be laying off workers forever or be slack all the time. They will get busy one of these days and when they do we must be ready to repair any damage done."

The last sentence is the important part of this quotation, indicating that the labor organizations recognize

the difficulty of the present situation for the unions. the necessity for quiet and careful development of their plans under such conditions or rather marking-time until a more favorable opportunity arises.

Organization development of this kind will not be stopped permanently by the mere starting of an open shop plan without any qualifications as to what the open shop means and without a sharp definition being drawn between the desire to destroy the union and the demand for equal conditions of work for all workers. No progress was ever made by taking the negative side of the situation only, and placing the emphasis of the campaign upon that. The only value of the negative is to draw from its consideration the positive improvement which can be secured by correction of the present difficulties.

The statements which have been made in the last few months regarding the open shop and which have come from the manufacturers' side, have emphasized the deficiencies of the union development and absurdity of the union position on these matters, but have not sufficiently stressed the positive position which must be taken in order to make an open shop policy successful.

If I suspected a man of trying to put something over on me, and he objected to the actions I had taken for my own protection as unjust, such objection would not be likely to decrease my suspicion unless he had positive evidence to offer that he was attempting to deal fairly with me and that he had a better plan to suggest.

Most of the workers know little or nothing of the manufacturers' plans, or policies, or desires. Most of them are suspicious of the manufacturers' motives and a very large number of them regard the union as their means of protection from the manufacturer.

Under these circumstances the objection of the manufacturer to the closed shop and his stated preference for the open shop without any definition of what he means, or any program of action which has a positive suggestion of improvement, is likely to increase the suspicion and the disagreement without offering any possibilities of permanent solution.

It will be very much better if there were less talk about the open shop and more careful study of its necessities and possibilities. As was stated in the beginning

of this article the open shop, that is, the shop where every man competent to do his work has the same opportunity to exercise his skill without respect to his organization affiliations outside, if conducted with justice and understanding, offers the greatest hope of manufacturing unity and the co-operation of labor, management and capital in the working out of his problems. This is so because such a shop would be humanly so far ahead of the union organization that it would offer an incentive and an opportunity to the workers that are not contemplated under any present union condition. If such shops were established in a sufficient number of cases, and if more of them were started, there would not be much necessity to make an outcry about the open shop or the closed shop, because the tendency would be sharply defined and the advantage definitely shown.

It is a poor way to start reorganization by degrading a possible improvement into a fighting term to neglect the positive opportunity in favor of negative reaction against deficiency. The progress toward a real permanent unified open shop will not be aided materially by those who are talking about it as a means of combating union influence to-day and whose remarks particularly show more vehemence than discretion in their approach to the problem.

If possible, it is to be hoped that we can approach the human side of industry so that it will be unnecessary for us to arrive at the highly organized condition exhibited in a country like Great Britain.

The solution of our difficulties will be secured much more rapidly and difficulties themselves will be much less if we can avoid that condition. That condition will not be avoided, however, by continuing the emphasis on the fighting side of the situation and losing the opportunity to emphasize the improvement side of the situation, which is to be gathered quite easily from the experiments that have been conducted so far.

The open shop is a better industrial condition than the closed shop, in some cases. In other cases, it is worse and the difference is entirely in the character of the shop and the measure of justice and understanding which has gone toward building it.

Novelties Are Prominent at the Automobile Salon

(Continued from page 1006)

in Spanish leather, and a one-piece windshield is fitted.

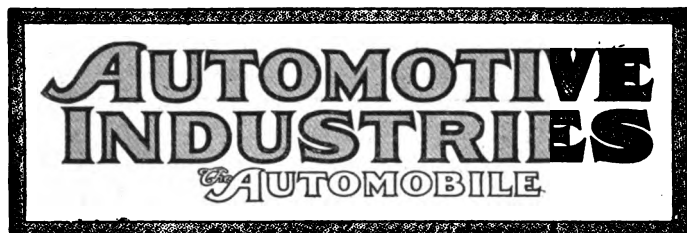
Another type of body shown is the suburban sedan with a landaulet type of body. This has doors inlaid with mahogany, and all windows can be completely lowered so the top of the glass comes down flush with the window sill.

On the Winton stand is shown a new standard sport model, a four-passenger car, built on the regular Winton 33 chassis with a six-cylinder $3\frac{3}{4} \times 5\frac{1}{4}$ in. engine. There is a storage compartment in the rear of the front seat. Two spare wheels are carried on the sides in front. Disk steel wheels are fitted. The windshield is a one-piece type, while other equipment is the same as on the Winton touring cars. The steering wheel is dropped about 3 in. as compared with the Winton touring model. In the Winton four-passenger sedan the rear deck has been replaced by a trunk carrier.

On the Cunningham stand is shown the model V-4 which is now fitted with Delco electric equipment. The rear spring has been increased in length to 62 in. Oil cups of the snap cover type are substituted for grease cups throughout the chassis. A thermostat is now incorporated in the cooling system, being inserted in the water inlet

to the cylinder jacket. The Cunningham exhibit features a 4-passenger chassis, which is guaranteed to develop a speed of 80 m.p.h. with regular equipment. This is the same chassis as used by Ralph De Palma in speed trials at Sheepshead Bay, in which he broke several world's records. The individual step and sod pan construction is continued by Cunningham.

In the Brooks-Ostruk exhibit is shown a sport body designed for four passengers. This model has individual front seats, which tilt forward to allow of free entrance to the rear seats. Single doors on both sides serve for entrance to both the front and rear seats. The body is made of crowned aluminum, the sides being concave toward the outside, and a curved bevel edge running along the top and around the rear. Spare tires are carried in front. The fuel tank is located at the rear, and is protected by mahogany slats. A California type of top is fitted, with a single oval plate window in the rear. The running boards are of mahogany, with longitudinal slots cut into them in which are inserted wavy metal strips, while corrugated metal strips are secured to the top of the runningboard.



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Contracts and Prices

THE present situation as to price adjustment has brought into prominence the meaning of a sales contract. It apparently has been the practice in America of considering an order merely as a memorandum of intent and the persons most concerned holding a mental reservation that they can cancel or delay as they may see fit, according to the drift of trade.

This situation is now working hardships on many parts makers in the automotive field. The car manufacturer has decided to cut the price of his product, and he expects the parts maker to share his reduction. Perhaps it is right that he hold this expectation, but is it right that he should cancel his contract with the parts maker because the latter does not immediately lower his price?

The parts maker, in many cases, has contracted for materials on a basis of the price agreed upon. In some cases they have large quantities of parts manufactured and are holding them for delivery when

called for. These men should at least be given a hearing as to whether they can reduce their prices without a loss.

Whatever may be the legality of a sales contract, it implies a moral obligation not to destroy the other party to it, if that can be avoided.

In the meantime trade associations would do well to give to this important factor some consideration and establish a sales contract that is equitable and stable. In England, a sales contract is a banking document.

Anticipate Demands for Parts

THE sales manager of one of the largest automotive parts concerns said the other day that it would take his plant ninety days to get back into anything like normal production when business picks up again. This statement may well cause some thought on the part of automobile manufacturers.

When the business slump started, the dealers felt the effects first, then the manufacturers and finally the parts makers. As business picks up again, the order will be the same. The dealers are already beginning to feel the effects of business revival; the parts makers will be the last to get the benefits.

But the automobile manufacturers, in order to play fair with the parts makers, must strive their utmost to look ahead, to anticipate their needs, and to place their orders far enough in advance so that the parts makers can have a reasonable opportunity to get back into production. Some of the parts makers feel that they are "holding the bag" to a large extent at present. Sudden demands should not be made of them when business revives; they cannot be expected to fill reinstated orders on a week's notice.

Many of the parts manufacturers are making a strenuous effort to keep their organizations in such shape that it can quickly be brought back to normal. The firm quoted above, for instance, expresses no sympathy with the movement among some manufacturers to reduce sales promotion effort and advertising during this time of business depression.

The sales efforts of this firm are being increased rather than curtailed upon the logical basis that sales effort is most necessary when business is lacking. This sales manager said as well, "To keep on top of your customers' changes and requirements at the present time means the exercising of greater care than ever before. All records must be kept exactly and changes on orders and shipping schedules made accurately and as quickly as received.

"... In all plants that are working on short time there are certain members of the factory organization who must be retained because it is cheaper to hold them than to let them go and endeavor to replace them when things brighten up. A sales organization should be able, and in fact must be able, to direct the production of parts which, if they cannot be shipped at present, are going to be most in demand when orders are forthcoming at a future date.

"It seems to me that the present time gives a sales organization a wonderful opportunity to show itself."

These statements are, of course, a strong plea for

the employment of more, rather than less, powerful force in sales promotion effort at the present time.

They indicate as well, however, the strenuous efforts being made by one parts maker to keep in touch with the prospective needs of his customers, to anticipate what their demands will be, so that he will be able to supply them on the shortest possible notice when business picks up.

Such efforts as this are deserving of the heartiest co-operation from the automobile manufacturer. He can render such co-operation by studying his own prospective needs, anticipating them insofar as possible, and giving the parts maker a reasonable chance to get back into production in time to fill those needs.

The Question of Overgeared Fourth Speeds

THE opinion has repeatedly been expressed that, in order to make it possible to get along with smaller engines on passenger cars and thus save on fuel, it may be found desirable to return to the four-speed gear, and in this connection the question was raised recently whether in this gear the direct drive should be on fourth or on third.

There is no doubt that on a car which is being provided with a four-speed gear with a view to fuel economy the direct drive should be on fourth speed. When four-speed gears were designed with an overgeared fourth the reasoning was that the owner occasionally would want to get out of the car on good level roads all the speed that could reasonably be expected, having regard to the size of the engine and the weight of the chassis (as, for instance, when a neighbor with a new car came up behind and gave the signal for you to clear the road). This called for one relatively small gear reduction between engine and rear axle. But if the final drive reduction was made small so that the direct drive gave the desired high speed, then the direct gear could not be used on grades of any importance, on fairly heavy roads and in traffic. In other words, it would be necessary to do much of the driving on the lower gears. The lower gears usually are somewhat noisy, and on the whole noise is more objectionable when going slowly than when going fast. Therefore, the geared-up fourth transmission was a happy solution of the problem presented by the prospect who desired a reserve of speed for special occasions, but who mostly would want to drive at moderate speeds and do as much of his driving as possible on the direct gear.

In the economy car we have to cut out right from the start any idea of incorporating features that will enable you to "trim your neighbor." Of course, it is also impossible to drive "on high" practically all the time and secure economy. The driving will have to be more nearly equally distributed among the different gears than is at present the case. The reductions can always be so proportioned, however, that the high speed is in use a greater proportion of the time than any of the other gears. From a fuel economy standpoint it is always advantageous to use the highest gear possible, provided it does not pull the engine

down to a speed where it runs unsteadily and begins to knock. Therefore, the highest gear should be used as much as possible and this makes it desirable to make this the direct drive.

There is an objection to an overgeared fourth, in that it is practically impossible to make the gears run quietly, on account of their necessarily high pitch line velocity. The overgeared fourth is a feature of luxury, designed to permit of occasional great spurts of speed, and is not in place on an economy car.

Barriers to Automobile Trade

AT the conclusion of a recent meeting of the Supreme Council of the Peace Conference a "Statement on the Economic Condition of the World" was issued in which it was urged that—

"The governments should also endeavor to contribute to the re-establishment of the economic life of Europe by facilitating the regular exchange of their domestic products and by removing all arbitrary barriers to the natural course of commerce. The Powers represented at the conference affirm anew their determination to collaborate with a view to carrying out this proposal."

Since this resolution was adopted there have been various attempts to erect further economic barriers, especially in connection with the automobile trade. Thus the French industry, which is now protected against American competition by a premium on dollar exchange of about 200 per cent, by high ocean freight rates and by an ad valorem duty of 45 per cent, recently demanded of the Government an absolute embargo on automobile imports. This demand is evidently in direct contrast to the conclusion of the Economic Conference, and in view of this fact the French Government could not well have granted it. Now, to save its face, the French Automobile Manufacturers' Association lets it be known that only a small fraction of the French industry was behind the demand for an embargo and the Association as a whole never favored the plan.

Italy also seems to be about to "erect new economic barriers" against trade in foreign automobiles. As regards American competition, the premium on dollar exchange is an even more powerful protection than in France, and freight rates to Italy also are somewhat higher, yet the Italian Government plans to levy a double duty on passenger automobiles, an ad valorem duty of 35 per cent and in addition a duty, based on weight, of approximately 10 cents a pound.

At a time when the American automobile industry is endeavoring to extend its export markets and already is working under a great handicap due to the foreign exchange situation, it is rather discouraging to see constantly new obstacles to foreign commerce arising. It is to be hoped that European governments in future will take more heed of the recommendations of the Economic Conference, in order that commercial relations may be re-established on the old lines and that prosperity may return to the nations.

Industry Seeks Tax Concessions

Net Loss Deduction and Deferment Asked

Emergency Legislation to Tide Manufacturers Over to Be Urged Upon Congress

WASHINGTON, Nov. 15—Whatever inventory losses were sustained by the automotive industry through recent price declines will be written off in tax returns provided the organized effort to obtain emergency legislation is successful. It was announced here to-day that Daniel Roper, former Commissioner of Internal Revenue, had been placed in charge of the movement which is intended to bring relief to these taxpayers who must pay the next installment of income and profits taxes by Dec. 15. It is proposed that Congress pass an amendment to the "net loss" section of the Revenue Act so that it will apply to the current year.

Price reductions were anticipated by Congress in the enactment of the Revenue Act of 1918, when provision was made to protect manufacturers and merchants from the effects of price stabilization. Inventories have been one of the problems of the automotive industry in the determination of tax returns. Congress expected that the post-war price flurry would be concluded before the expiration of the taxable year of 1919. With this period fixed in mind, it was provided that "if for any taxable year beginning after Oct. 31, 1918, and ending prior to Jan. 1, 1920, it appears upon the production of evidence satisfactory to the commissioners that any taxpayer has sustained a net loss, the amount of such net loss shall under regulations prescribed by the commissioner with the approval of the secretary be deducted from the net income of the taxpayer for the preceding taxable year."

Appeal to Be Made at Once

Roper, as spokesman for many industries which have been hit by the downward movement of prices, will appear before Congressional committees, immediately on the reconvening of Congress next month to urge authority for the postponement of the last installment for six months and an extension of the "net loss" provision to cover the taxable year of 1920, the period in which price recessions have been marked.

While high prices prevailed, manufacturers and others engaged in business were given their choice of two methods in filing tax returns. Invariably the market value, being out of proportion to costs during the period of inflated prices, was selected by taxpayers. The decline in market values in many instances has

put the value of the manufactured product below production cost. The taxpayer is obliged under the law to maintain the method originally adopted in a boom market. The amendment, if passed, would allow taxpayers, business concerns, which have recorded losses this year through shrinkage of values of stocks on hand, to deduct these losses from the income of 1919 in filing returns.

There has been talk of relief from the Federal Reserve Board in tiding over various firms, but Treasury officials point out the fact that the Federal Reserve Act does not give this authorization. The only relief must come through legislation. As to the necessity for action, Roper stated today:

Inventory Losses Large

"The tremendous decline since the first of this year in the market value of many staple commodities has resulted in an almost unprecedented shrinkage of inventory values. In many instances, these losses exceed the entire net income for 1919, and the unfortunate companies possessing such goods find themselves unable to convert their wares into cash or to obtain credit at their banks by which to meet their taxes, based upon their paper profits—profits that have never been realized. In some of these cases under the present law, unless it is amended before Dec. 15, it will be mandatory upon the Treasury to collect the tax by court action through distraint proceedings. This would mean financial disaster in many cases.

"A plan should be devised for legislative relief for such cases, whether arising from inventory losses or from other industrial and financial conditions, by deferring the tax payment for a period of, say, six months, under such safeguards as will extend the benefit only to those concerns which can not pay the tax. Where such payment is deferred, I would suggest that the normal rate of interest be as high as 8 per cent, to discourage those who might improperly take advantage of the Government under a lower rate of interest."

BARLEY ON FIVE DAY BASIS

KALAMAZOO, Nov. 15—Barley Motor Co. plant is now running five days a week, with about half its regular force on the payroll. Fuller & Sons Mfg. Co. is down completely but expects to start up again within four weeks. Operating full capacity this plant employs nearly 800 hands.

TO MAKE COMBINATION CAR

WICHITA FALLS, TEX., Nov. 15—The Wichita Motor Co. is preparing to put on the market a special car to be known as "the oil field tool pusher." It will carry three passengers and 1000 pounds of equipment.

Bankers Push Plans to Finance Exports

Seek Operation by January of \$100,000,000 Foreign Trade Corporation

NEW YORK, Nov. 12—Plans for the proposed organization by the American Bankers Association of a central foreign trade financing corporation with a capital of \$100,000,000 set forth that it should commence operations early in 1921, preferably in January, and that it should be representative of the entire United States, the various districts of which should have memberships on the board of directors and that parts of the funds be devoted to financing exports arising in these districts.

These aims, set forth in the report of the association's Committee on Commerce and Marine and adopted at the recent convention at Washington, will be followed in forming the new banking company, which will be organized under the Edge law. Another meeting of bankers and business men has been called by President John S. Drum, of the association, to meet at Chicago on Dec. 10 to take further action in the formation work.

The corporation in its entirety was planned by committees of the bankers association, the Chamber of Commerce of the United States and the National Foreign Trade Council. With a capitalization of \$100,000,000, the corporation, it is set forth, would be permitted to issue debentures against foreign securities to ten times that amount, thus giving it a maximum financial ability of about one billion dollars. The necessity for this great volume of potential financing is given by the committee as follows:

Must Maintain Foreign Sales

"We must have outlets for our products; a certain volume of foreign sales must be maintained, or the prosperity of the country will suffer throughout. But, after all, the purpose of the corporation would be two-fold: to render service not only here in promoting increased wealth and settled conditions but also abroad where such service can be safely rendered without undue risk and to the advantage of America's export trade. This can assuredly be done."

The company will be general in its nature, its facilities being open for all legitimate trade.

The organization work is under the direction of the association and its newly formed Commerce and Marine Commission, of which John McHugh, vice-president of the Mechanics & Metals National Bank of New York, is chairman, and William F. Collins, the secretary.

Akron Companies Cut Tire Prices

General Reduction Made by Leaders

Goodyear, Goodrich and Miller Take Initiative—Other Com- panies Study Action

AKRON, Nov. 15—Tire reductions ranging from 3 to 20 per cent have been put into effect by the Goodyear, Goodrich and Miller companies, the Goodrich prices going into effect coincident with their announcement Friday, and the Goodyear and Miller becoming effective to-day. Every tire manufacturer in Akron is expected to join the lower price movement within a week, indicating that the long expected break has arrived.

Greatest reduction among the three companies has been made by Goodrich, the cuts including all tires, both pneumatic and solid, and tubes. The general decrease ranges to 15 per cent and in some instances approximates 20 per cent, depending upon the size and construction.

The Goodyear cut is not a flat reduction in all sizes but reaches 15 per cent at its highest point. On all weather tread cord casings the cut is $7\frac{1}{2}$ per cent, 10 per cent is dropped on straight side fabric all-weather casings, and irregular reductions ranging from 3 to 14 per cent on clincher fabric tires. Rubber tread casings, both cord and clincher fabric, now list at the same price as all-weather tread casings except on the 30 x $3\frac{1}{2}$ clincher cord casing. Extensive improvements have increased manufacturing cost on this tire, officials say and no reduction is possible.

Regular tubes are reduced 15 per cent and heavy tourist tubes 10 per cent. There is no reduction in price on "tire savers," repair material or motorcycle casings or tubes.

Miller decreases range from 3 to 15 per cent. On cord tires the reductions average 12 per cent and from 10 to $12\frac{1}{2}$ per cent on fabrics. Tubes have been cut on an average of 15 per cent.

Officials of smaller companies here to-day confirmed the report that they had been waiting for larger companies to start the downward trend and that they would release new price lists covering their products this week.

Crude Rubber at Low Level

Crude rubber prices now have reached the lowest levels on record. It is now selling around 20 cents a pound, as compared with 55 cents before the war for plantation. Conditions in the market are chaotic and have developed furious speculation by outsiders. Estimates of the stock held in this country place it at about 15,000 tons, or twice the supply

TRANSPORT BY TRUCKS; TRANSPORTATION, RAIL

WASHINGTON, Nov. 15—Transportation is transportation just as "pigs is pigs." There is a difference between hauling goods on a railroad and hauling the same goods on a motor truck. That difference now has been defined and a fresh meaning for another word goes into the dictionary automatically. Here is the difference:

Transport refers to merchandise transported by motor vehicles.

Transportation refers to merchandise transported by railroads.

The definition is authoritative for it has been adopted by the Highway and Highway Transport Committee of the Federal Bureau of Education.

usually on hand at this period. The industry was under Government control during the war and for that reason did not receive the same impetus as other industries, but it shared in the general inflation which followed the armistice.

Tire manufacturers had bought heavily and when the slump in business came they faced an urgent need for curtailment, but they did not attempt to get out of their contracts. They merely requested the rubber dealers to hold the commodity for future instructions, in most cases agreeing to pay the carrying charges themselves. This is one of the brightest features of the muddled situation.

Ajax Lowers Tire Prices

NEW YORK, Nov. 13—Ajax Rubber Co., Inc., will reduce prices 10 to 15 per cent, effective Nov. 15. The reduction is made, President de Lesser declares, to increase the volume of business. Though the company with others is suffering because of the depressed buying, he asserts it is still operating at a profit. Factories of the company are at Trenton, N. J.

The Republic Rubber Corp. will join in the general move to cut tire prices with a reduction of 15 per cent. The company now is operating at 25 per cent of capacity.

I. H. C. TRUCK OUTPUT GROWS

AKRON, Nov. 15—A new schedule calling for an increase of 20 per cent in production went into effect to-day at the Akron plant of the International Harvester Co., which manufactures motor trucks. Announcement of the increase was made after a visit to the plant by A. A. Jones of Chicago, assistant manager of the I. H. C. automotive works. The tire industry is much gratified by the move for it will mean increased demand for truck tires.

Standard Oil Cuts Gasoline One Cent

Eastern and Southern States Benefited—Six-Cent Drop in British Market

NEW YORK, Nov. 15—Announcement of a reduction of one cent a gallon in tank wagon prices of gasoline in States in which the Standard Oil Co. of New Jersey and the Standard Oil of Louisiana operate, is made by the New Jersey company. It will become effective to-morrow. The States include New Jersey, Maryland, Virginia, North Carolina, South Carolina, District of Columbia, Louisiana, Tennessee and Arkansas.

The reduction in price is said not to reflect lower costs but to be merely a move on the part of the companies to aid in the lowering of prices as part of the general commercial readjustment. Prices of tank wagon gasoline will vary in the different States because of the difference in freight costs. No prediction was made as to the effect upon retail prices.

The lowering of the price follows a drop of 6 cents a gallon announced by British companies because of "over-production in the United States." The drop in that country came as suddenly and unexpectedly as the increase of 14 cents a gallon made in August. Consumers in England attribute the slump to an investigation which is being made by the Central Profiteering Committee into the increase in price.

Producers in this country assert the belief that the lower price is due to a weakened market resulting from the entry of Russian products into the English market. It was predicted this would curtail shipments from the United States. Producers scoffed at the idea that there had been over-production in this country.

The Standard Oil Co. of New York has closed a contract with the Mexican Petroleum Co. under which 150,000,000 bbl. of gasoline will be delivered to the American corporation next year. The contract replaces one made a few years ago with the difference that the quantity to be delivered is much larger and the price substantially higher.

LEACH GUARANTEES PRICES

LOS ANGELES, Nov. 15—The Leach Biltwell Motor Co. has guaranteed its prices against decline until July 1 next. No guarantee is given against an increase in price, however. The five-passenger model sells at \$5200, the three passenger roadster and the seven passenger touring car at \$5700 plus war tax.

Standard Parts Near End of Receivership

Approval of Financing by Stock- holders Smooths Difficulties —To Sell Five Plants

CLEVELAND, Nov. 15—Lifting of the receivership of the Standard Parts Co., probably by Dec. 1, seems probable as the result of action by the stockholders in ratifying a refinancing plan proposed by committees representing the creditors and stockholders. In its broad aspects this plan was acceptable to L. H. Perlman of New York whose action in seeking an injunction restraining the officers of the company from issuing 50,000 shares of common stock precipitated the receivership. This stock will not be issued.

The acceptance was made by the stockholders after the committee and officers of the corporation disclosed that the company has plants and organization to produce \$40,000,000 worth of goods per year; that the company to-day has orders booked for \$16,000,000 worth of goods; that after allowing liberal reserves for accounts receivable, inventory and plants there remained an equity of \$12,600,000 for stockholders; that after taking care of the preferred stock at par, with all back dividends, there is an equity of \$6,000,000 for common stock and that since J. O. Eaton took hold of the management of the corporation six months ago the net earnings were \$663,000.

Under the refinancing plan, the stockholders are to subscribe to \$4,000,000 worth of Class A preferred stock of the company; a number of Cleveland investment houses have agreed to underwrite \$4,000,000 of the preferred stock and local banks are to provide \$3,000,000 of credit on reasonable terms provided the refinancing plan was accepted by stockholders and their necessary subscription was made.

That the whole plan will be carried out was prophesied by officers and directors. It was stated that stockholders already have subscribed for one-third of the amount allotted to them, many calling and entering subscriptions before the plan was officially submitted to them.

Eaton Contract Cause of Suit

Frank A. Scott and J. O. Eaton were appointed joint receivers of the company a few months ago by Federal Judge D. C. Westenhaver on the application of a stockholder who alleged that he was disappointed with a contract made for the retention of J. O. Eaton as general manager of the corporation. Other causes also were assigned for the suit.

Scott said at the meeting of stockholders that usually a receiver finds a company's affairs in worse shape than they appear on the surface, but in the case of the Standard Parts Co., conditions were better than they appeared. He said he thought Eaton and his associates were doing what was right and if he were a stockholder he would want Eaton

as manager. Scott said that the central office overhead had been cut more than 50 per cent and economies had been effected in all departments. He also said the company was far from insolvent.

Horace Andrews, of the law firm of Hoyt, Dustin, Kelley, McKeenan and Andrews, presented to the stockholders the plan for the refinancing and reorganization. He said that the Standard Welding, Bock Bearing, Perfection Springs, and Eaton Axle plants, which are subsidiaries, rank with the leading plants of their kind in the country. He said that it had been decided to sell the rest of the plants owned by the corporation and to use a portion of the proceeds of this sale to retire the prior lien preferred stock, thereby strengthening the other securities of the company.

Will Discontinue Five Plants

This means that the following plants of the company are to be sold: The Cincinnati Axle, an axle and a spring plant at Canton; the American Ball Bearing plant in Cleveland, and the Vehicle Spring and Axle Plant at Connersville, Ind., or five in all.

F. F. Prentiss, one of the directors, advised stockholders that the old contract with J. O. Eaton had been annulled and that the 50,000 shares of stock issued thereunder had been returned to the company's treasury. On behalf of the company he then offered a new service contract to Eaton and this was referred to the new board of directors, who were empowered to act in the matter.

Fred H. Goff, president of the Cleveland Trust Co., as chairman of a special committee consisting of Andrew Squire and J. O. Eaton in addition to himself, proposed the following as directors and they were voted into office: F. F. Prentiss, J. O. Eaton, H. P. McIntosh, John Sherwin, William L. Day, Dudley S. Blossom, Walter D. Sayle, Franklin G. Smith, A. W. Henn, E. J. Hess, F. R. White, W. E. Bock and W. H. Prescott.

October Shipments Show General Drop

NEW YORK, Nov. 15—Shipping reports received by the National Automobile Chamber of Commerce, covering 90 per cent of the total volume of business, indicate that complete figures for October will show shipments of 18,000 carloads of automobiles, 12,000 driveaways and 2200 machines shipped by boat. This compares with 29,843 carloads, 13,402 driveaways and 3753 boat shipments in October of last year. Figuring the driveaways and boat shipments in carloads, the October business is 25 per cent less than September and 38 per cent less than October, 1919.

HIGHLAND TRUSTEES NAMED

BOSTON, Nov. 12—Faelton C. Perkins, Angier L. Goodwin and Samuel J. Freedman were elected trustees in the bankruptcy case of the Highland Machine Co.'s first meeting, before Referee Olmstead, in the United States Bankruptcy Court.

Kelly Truck Added to Hare's Companies

New Management to Push Pro- duction and Sales—Hare's Officers Take Charge

SPRINGFIELD, OHIO, Nov. 15—"Beginning at once the operation of the Kelly-Springfield Motor Truck Co. will come under the control of the Hare's Motors which also operates the Locomobile Co., the Mercer Motors Co., and the Simplex Automobile Co., Inc.

This announcement is contained in a letter, which is being issued by the Kelly-Springfield Motor Truck Co. to the Kelly dealers. The letter is signed by James L. Geddes, chairman of the board.

Concerning the affiliation of the two organizations and the future of the Kelly company, the letter says in part:

"At a directors' meeting held in New York the writer was elected chairman of the board of directors of the Kelly company and Emlen S. Hare, president of the Kelly company.

"The purpose of this combination is to increase the volume of business and we ask your co-operation to attain this. We now have a completely equipped factory, capable of big production, and with this in mind more ability, and not less, will be required.

"With the addition of the Hare's Motors engineering and supervision you can be assured of even greater engineering advancement than in the past, as the ideas of several engineers combined will result in advanced ideas."

Besides selling the output of the Kelly company's plant, the officers of the Hare's Motors Corporation will enter into the management of the company. Three of the Hare's Motors officials will become vice-presidents of the Kelly company, as follows: H. D. Church, vice-president in charge of engineering; Ormond E. Hunt, vice-president in charge of production, and Henry Lansdale, vice-president in charge of distribution. These three vice-presidents are all old Packard officials who left that company and joined the Hare's Motors.

There was elected at the meeting of the board of directors in New York at the same time the following directors: Emlen S. Hare, H. S. Parker, J. A. Bower, of New York City; Horace E. Schenck and P. A. Lewis, of Springfield.

Parker is of the firm of Colgate, Parker & Company, and Bower is vice-president of the Liberty National Bank, of New York City.

The stockholders of the Kelly-Springfield Motor Truck Company at a meeting here two weeks ago authorized the increasing of the common stock \$2,000,000.

PRESTON RESUMES STRIDE

BIRMINGHAM, ALA., Nov. 15—The plant of the Preston Motors Corp. is now in full blast and the management asserts that it has on hand more than 1000 bona fide orders.

Fokker Seeks Sales for Monoplane Here

Would Defer All-Metal Construction While Waiting Tests—
Studies American Plants

NEW YORK, Nov. 16—Anthony H. G. Fokker, inventor of the Fokker monoplane which served Germany so well in the world war, arrived in this country last week in search of business, as he frankly admitted. He is now in Washington, presumably in an effort to sell planes to some branch of the Government. He was accompanied by Col. Virginius Clark of McCook field.

While Fokker's visit is primarily a search for business, he will take advantage of the opportunity to inspect American airplane plants and study the progress of aviation in this country. He already has looked over the Curtiss plant at Mineola.

In some respects Fokker's views on the future of aviation coincide with those of American makers of aircraft. He does not believe manufacturers should rush headlong into the building of all metal planes but should await the results of careful study and experimentation before taking so radical a step. In this respect his opinions differ from those of Dr. Junker and other Germans who are attempting to sell this country on the all metal plane in which they have been pioneers, chiefly because of necessities imposed by the war.

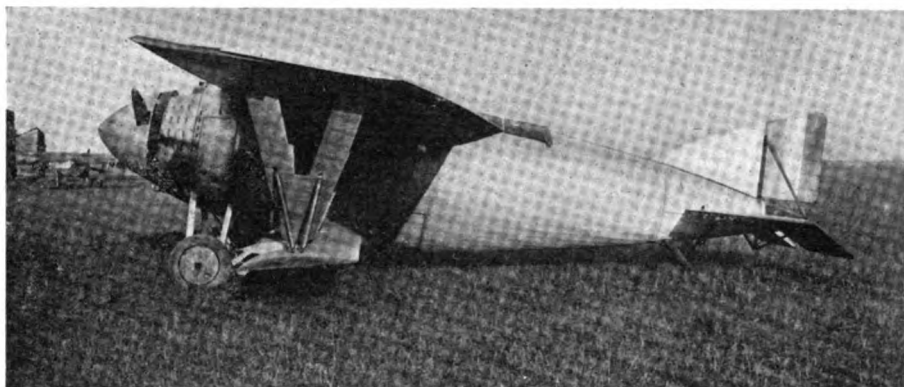
Fokker was accompanied to this country by his secretary, Robert B. C. Noorduyn, formerly chief engineer of the Armstrong Whitworth works in England. While he built planes for Germany during the war Fokker never lost his Dutch citizenship. He asserts that he offered his machines to England and the United States in 1912 but they were refused and he then turned to Germany. He never was in the German army, however, or in the service of the German Government.

Monoplane Fastest in War

The fuselage of the Fokker pursuit plane, acknowledged by the Allies to have been the fastest used in the war, was made of steel and the wings of wood, without struts or braces. Just before the armistice was signed Fokker had invented a new machine gun designed to fire 4800 shots a minute. He explained this by saying that the Allies had five times as many planes as Germany and it was necessary to make a gun which would shoot six times as fast.

The Dutch inventor said his new commercial airplane was carrying the mail daily between London, Brussels, Berlin, Hamburg and Copenhagen.

"The feature of my machine," he said, "is the cantilever wing, having no braces and attached to the fuselage by four bolts, eliminating adjustments. The frame is of seamless tube steel. The wing is constructed of three ply wood, responding to strain without deterioration and capa-



The Levavassor Variable Wing Plane

Novel wing construction permits plane to fly at 90 m.p.h. and land at 30 m.p.h. It is considered certain the builder will win the French safety prize

ble of supporting six times the normal load. An altitude of 4000 meters can be attained in 40 minutes with a load of 1550 lb. The machine will carry six persons, five hours' fuel supply and develops 185 horsepower with a speed of 105 miles an hour.

"Next year we will have 12 machines in the Amsterdam-London service, each carrying 980 lb. of mail. We are now building a new 12-passenger type of 450 horsepower with an average speed of 110 miles an hour. Our new factory in Amsterdam can turn out 20 machines a month and employ 500 men."

Fokker is a firm believer in the future of commercial aviation and believes that regular trans-Atlantic flights will be made in the near future in perfect safety.

Saulnier, a French inventor, is another foreign aviation expert now in this country. He has come here in connection with a proposal for the construction of a plant in this country for the manufacture of his machines with American capital.

Complete 456 Homes for Akron Workers

AKRON, Nov. 15—Its first big program of 456 dwellings has been virtually completed by the Home Owners Investment Co., formed eighteen months ago by F. A. Seiberling, H. S. Firestone and other tire manufacturers. The company was capitalized at \$5,000,000 but only \$2,100,000 of the stock was sold. The corporation operates on the plan of loaning up to 90 per cent of the value of the completed home if the prospective owner has a lot paid for which alone or with other collateral is worth at least 10 per cent of the cost of the house. The promoters are taking only 6 per cent on their investment and all other earnings will be turned into a fund to build other houses.

TO LEASE FLYING FIELD

LYNN, Nov. 13—The Lynnway Aircraft Corporation has offered the city of Lynn \$3,250 for a four years' lease of 57 acres of reclaimed land on Broad Street which it has used since the summer as a flying field. It is proposed to restrict the use of the field to aircraft and keeping and selling auto accessories.

Levavassor Builds Variable Wing Plane

French Aviation Pioneer
Achieves Model Capable of
High and Low Speeds

PARIS, Nov. 1 (*Special Correspondence*)—An airplane with variable wing surface, capable of starting and landing at low speeds and of flying at high velocities has been produced by Engineer Levavassor and undoubtedly will win the French prize for the best device for making flying safe.

Levavassor, the inventor of this machine, is a French pioneer, who built a plane which flew before the Wrights appeared in Europe, who secured fame as the designer and builder of the Antoinette monoplane so successfully flown by the late Hubert Latham, and who built the first light weight 8-cylinder aviation engine in Europe. The new Levavassor biplane has a wing with a fixed central portion and two additional surfaces, one of which can slide under and the other over the main surface. For starting and landing the additional surfaces are pushed respectively forward and rearward, thus considerably extending the chord of the wing. When in the air the two surfaces are brought respectively under and over the wing, thus reducing the bearing surface.

In the experiments carried out near Paris the device proved very successful, no difficulty being experienced in varying the wing surface while in flight, with the result that the plane attained a speed of 90 miles an hour in full flight and landed at 30 miles an hour.

MARK CANADIAN AIRLINE

OTTAWA, Nov. 15—With airdromes marked out every fifty miles and with wireless control of the planes, there would be nothing to prevent a regular forty-hour air service between Halifax and Vancouver, according to General A. K. Tylee, who has reached Ottawa on his return from the successful trans-Canada flight.

Special Cables

Olympia Show Ends with Outlook Better

Sales Resumption Forecasted for New Year—Critique American Open Models

(By Cable to AUTOMOTIVE INDUSTRIES)

LONDON, Nov. 13—The motor show, which closed at Olympia to-night, ended with better trade prospects than were apparent at the outset. The volume of actual business steadily improved but the prospective trade was the bigger feature.

The demand was mainly for light cars, apparently because of price, new taxation and elimination of paid drivers. Business in medium priced cars was moderate but difficult to gauge because there has been much silence regarding it. The call for big automobiles is slumping and many owners of them say they must buy small cars.

Much of the blame for lack of business was placed on the government because of its action in increasing taxation on horsepower rating. An effort probably will be made to have it reduced by half, but it seems too late to get action for the next fiscal year.

American sedans won much approval at the show. They were more roomy than the others and their appearance was good, but the open American cars were criticized for lack of seating comfort and the intrinsic quality of the body work. These cars were held to be too expensive as compared with European cars of the same class.

Business prospects are not expected to declare themselves before the new year, as price reductions may be looked for by that time. Dealers and the public are holding back in this belief and because of the present financial strain. Improved trade and the promise of normal business stability will decide the fate of many motor concerns here.

Altogether the situation at the close of the show is more hopeful but far from satisfactory.

The comparative absence of commercially useful novelties at the show has led old hands here to discuss the possibility of motor shows meeting the fate of the bicycle shows. They hold that the only justification for motor car displays is the business element. Next year's show probably will go far to decide the future of motor expositions or at least of annual displays.

SWEDEN PROPOSES TAX

NEW YORK, Nov. 15—A proposal to tax automobiles in Sweden has been made by the Swedish Highway Commission, the yearly rate being 50 crowns (\$13.40 at normal exchange) for all cars having a horsepower rating of ten or less, with an

added 10 crowns (\$2.68 at normal exchange) for each additional horsepower. This proposal was reported to the Bureau of Foreign and Domestic Commerce by Consul General Dominic I. Murphy, of Stockholm, under date of Oct. 19.

No tax, either governmental or municipal, has been imposed there on automobiles, Consul Murphy declares. To make the proposed tax effective, the Highways Commission recommends that all owners of automobiles, upon applying for registration, must furnish exact details as to the horsepower. The tax is to be collected by the Government and afterwards distributed to the various districts for road maintenance. It is intended to cover all cars, whether used in the cities or in the country.

Wrigley Shows Loss of \$722,000 in Year

LONDON, Oct. 29 (*Special Correspondence*)—The just published fiscal year's report of the E. G. Wrigley Co. of Birmingham, makers of tools and motor components, is not likely to allay the unrest of investors in British motor stocks of the more speculative sort. In April last the company had an issue of 300,000 ordinary shares at \$5.50 each for the purpose of carrying out its policy of extensions and to finance the acquisition of interest in J. Tylor & Sons, Ltd. and Holcroft's Steel Foundry, Ltd. It paid an interim dividend of 24 cents per share in the spring of this year, which apparently was provided from the reserve.

The report shows a net loss for the year of nearly \$722,000. Naturally there is no final dividend and the shares which previously have been quoted at $\frac{5}{8}$ to $\frac{7}{8}$ became a nominal market yesterday at $\frac{5}{8}$ to $\frac{7}{8}$. This exceedingly unsatisfactory result is attributed to the molders' strike, but even so the directors appear to have laid themselves out for severe censure in paying the interim dividend.

BOILLOT SIGNS WITH SUNBEAM

PARIS, Nov. 1 (*Special Correspondence*)—André Boillot has joined the Sunbeam racing department and will be at the wheel of a Sunbeam car in both the Indianapolis 500-mile event and in the French Grand Prix. Boillot has been connected with Peugeot since his school days, and indeed the whole Boillot family is attached to the Peugeot company in some capacity or other. It will be remembered that his brother George, who was killed during the war, had been connected with Peugeot during the whole of his career.

Sunbeam and Darracq are working together on their racing program, for the two firms are now combined. The cars are being designed by Louis Coatalen, but those bearing the name Sunbeam will be built in the Sunbeam shops at Wolverhampton, England, while the Talbot-Darracqs will be produced in the French factory of the Darracq company. It is not yet known who will be selected to drive the Darracqs, but René Thomas is spoken of as possible member of the team.

Standard Oil Moves to Cut Costs Abroad

Begins Installation of Bulk Storage Tanks—Fuel Costs Check Touring

PARIS, Nov. 1 (*Special Correspondence*)—A fight between Standard Oil and Royal Dutch interests in France is just beginning and undoubtedly will be instrumental in reducing the retail price of gasoline. In France all gasoline is sold in cans of 5 litres, with the result that costs are unnecessarily increased. The Standard Oil is now making arrangements to install bulk storage tanks on the premises of roadside dealers and in garages, charging the mere cost for this work. By thus abolishing the cost of the cans, labor in filling them, depreciation and renewal, a considerable reduction will be possible in the retail price of gasoline. The few dealers who have already adopted bulk storage at their own expense have been able to drop the price of gasoline from 56 to 51 cents per litre. The bulk of the gasoline sold in France is handled by small grocery and dry goods stores, and these men will not go to the expense of installing tanks. The Standard Oil's offer to do the work at cost undoubtedly will interest them.

During 1911, 1912 and 1913 France imported 190,000 tons of gasoline annually. During the four years of war the importation was 1,500,000 tons; in 1919 it was 350,000 tons, and for the first six months of 1920 the amount was 250,000 tons. Although there is a big increase in the consumption of gasoline compared with the pre-war period, France is not using as much fuel as she should. During the month of August, which is the period when the greatest number of passenger cars are in service, the consumption was the lowest on record. This is owing to the fact that owners preferred not to use their cars rather than pay from \$1.80 to \$2.40 for a gallon of gasoline.

Recent borings near Clermont-Ferrand, France, have revealed the presence of petrol. Oil was struck at a depth of 1500 feet between the Crouelle and Poix hills, about three miles from the town of Clermont-Ferrand. These borings were undertaken under the direction of the Government geological service, and the belief is held that an important supply of petrol is available. The search for petrol is also being carried out in various parts of the French protectorate of Tunisia with very encouraging results.

MAKE NEW PISTON RING

CLEVELAND, Nov. 13—The Pennsylvania Piston Ring Co. of this city has begun the manufacture of a piston ring known as the Instant-Pep-Co. It is a concentric ring with lap joint and there are two angular oil grooves on the outside.

Tractor Education Need of Argentina

American Sales Manager Finds Fine Potential Market in South America

NEW YORK, Nov. 12—The spirit of what the tractor means in agriculture has to be told not only to the farmers but to the concerns engaged in selling tractors in Argentina and other South American countries, according to C. W. Hadden, who has just returned from a six months' investigation trip through several countries of South America. The dealers in those countries have to be educated on what a tractor can accomplish. The farmers have to be educated on what a tractor will do on a farm of 160 hectares or any other size. These farmers have to be educated on what quantities of fuel are needed in cultivating such an area. They are not familiar with the various possibilities of using a tractor in addition to cultivating the soil.

Hadden, who made the trip in the interests of the Minneapolis Steel & Machinery Co., of which he is export manager, believes there is a large potential market for tractors and that our present type of small machines will meet the requirements of a great agricultural area such as Argentina. As an example he cites a farmer owning 160 hectares which he wished to cultivate in flax. The farmer estimated that fifty horses were necessary for this work. He has purchased two tractors and expects them to be sufficient.

Each horse in Argentina calls for the produce on $1\frac{1}{2}$ hectares to feed it for a year. These horses are not much more than 50 per cent as capable as the American horse. A big educational program is needed to educate the farmer to the possibilities of the tractor and to have him think intelligently on the capacity of a tractor as compared with the capacity of horses.

Should Make Direct Connections

Hadden recommends that tractor manufacturers should attempt to establish their own direct connections with importers in these countries. The manufacturer must not lose interest in the tractor once it is loaded on ship at New York port. The growth of his future business depends on the good operation and careful maintenance of the machine. This is best done through some direct representation in Argentina or Brazil.

He cited examples of some tractors little known in the United States and which had been exported in larger numbers than they were sold domestically, but which had not received the necessary service and were a bad advertisement. In Argentina plowing is generally done with a 14-inch bottom, three or four horses being necessary on a single bottom plow. Some farmers use two 10-inch bottoms.

The sale of tractors in Argentina is

just getting started. In 1918 approximately 100 were sold, 400 in 1919, and in 1920 approximately 1000. The European tractor has not got started in large quantities. Approximately ten Renaults and two Fiats have been sold. Three or four makes of American tractors are selling in considerable numbers and while the majority of American makes are not selling well, they are nearly all represented. The trouble is lack of education on the tractor movement in general. Mr. Hadden recommends some co-operative activity on the part of tractor manufacturers by way of educating the consumer on what a tractor is, what it will accomplish, and how it must be serviced.

Canada Defines Duty on Tractor Imports

WASHINGTON, Nov. 13—Increased demand for American tractors has brought inquiries from manufacturers as to duties assessed by Canada on these imports. The American consul general at Winnipeg, Manitoba, has obtained the latest data as to customs duties which show that tractors valued at not more than \$1400 imported by farmers for farm use are admitted free of duty but subject to an importer's sales tax of two per cent of the value.

Tractors valued at less than \$1400 imported by machinery companies for sale to farmers for farm use are admitted upon declaration of the importer to that effect, subject to duty at the rate of $17\frac{1}{2}$ per cent of the value and an importer's sales tax of one per cent to be estimated on the value plus the duty paid. Tractors imported for farm purposes which are valued at more than \$1400 are dutiable at $17\frac{1}{2}$ per cent and an importer's sales tax of two per cent estimated on the duty paid value. Where tractors are imported for other purposes than farm use the duty is fixed at $27\frac{1}{2}$ per cent of the value, plus the two per cent importer's tax. The importer's sales tax has been effective since May 19, 1920 and the free entry of tractors for farm use when not valued for more than \$1400 since Feb. 7, 1919. Knocked down tractors have the same rates.

TUNIS TO SHOW TRACTORS

NEW YORK, Nov. 12—An exhibition of foreign and French makes of automotive farm equipment and tractors, with a week's trials, will be held in Tunis from March 17 to 24, 1921, according to a report from Vice Consul Charles B. Beylard of Tunis to the Bureau of Foreign and Domestic Commerce. Entries will be received until Dec. 1.

The Consul reports that Tunisian farmers are realizing the possibilities of power farming. Up to July, 1919, he says, there were no more than 50 tractors in the district, but during the twelve months ending July, 1920, 558 tractors were imported into Tunisia. Of these, 54 were of French manufacture and 504 of foreign, mostly American, manufacture.

Output Insurance Gets Trial in Italy

Manufacturers Make Contract With Lloyds to Protect Against Production Loss

WASHINGTON, Nov. 12—Advices were received to-day from the American commercial attaché at Rome as to the plan of mutual insurance against interruption of industrial activity. The incessant and costly halts in steady industrial operation, which have beset Italian producers, brought into being a definitely organized scheme on the part of the Italian Manufacturers Association to provide insurance against interruptions in the continuity of production. The aim, of course, is to insure against financial losses incident to cessation of production.

The American attaché stated that the new insurance arrangement will go only so far as to guarantee the insured members against losses arising from interrupted production which are readily ascertainable. The assurance of a minimum profit on the invested capital whether production keeps up or stops, is left to be worked out in the future. According to the Government agent the insurance is a safeguard against "unexpected damages," the liability of those fixed general expenses which are incurred even when a plant closes down entirely. The manufacturer having membership in the new organization must arrange for insurance in the amount of a total fixed amount. One three-hundredth of this amount will be the sum payable for every day of inactivity, on the assumption of 300 working days in each calendar year.

It is further explained that "coefficients" are to be determined by the association's board of directors, which will be graded according to the liability of the various kinds of industry to interruption. It is the intention of the association to use these coefficients as a basis for premiums. The maximum premium will not exceed 5 per cent of the total amount of insurance. Provision is made for an assessment of 5 per cent additional should the initial amount be exhausted.

Safeguard Expenses at Outset

The insurance contract is with London Lloyd's which provides for an initial reserve of 20,000,000 lire. Two limitations have been made to guard against heavy losses at the beginning of the project. These items refer to the right to payment of damages making it impossible for a new member to obtain damages until the expiration of two months as a holder of an insurance certificate. Neither will payment be made for the first seven days of inactivity, supposing that production is halted for so long a period.

The information which has been distributed by the Department of Commerce here has created a profound impression in labor circles as well as in business.

Minnesota Approves State Roads Plan

Under Babcock Bill 28,850 Miles of Improved Highways Are Made Possible

MINNEAPOLIS, Nov. 12—By a decisive majority the voters of the state have "lifted Minnesota out of the mud" by approving the constitutional amendment known as the Babcock good roads plan at the recent general election. The Babcock amendment, so-called after C. M. Babcock, state highway commissioner, its author, authorizes the construction and provides a method for the financing of a state trunk highway system of approximately 7000 miles of arterial roads during the next ten years. By the establishment of the trunk highway system, all local funds—state aid, county and township levies—are left intact for utilization by these units in the construction of local or feeder roads, an arrangement which according to Babcock, makes possible the construction of 21,850 miles of graveled roads by the minor governmental units in ten years.

In other words, the citizens of Minnesota have given their approval to a plan which will mean 28,850 miles of improved roadway before the end of 1930.

These trunk highways which are to extend to every section of the commonwealth, are to be "located, constructed, reconstructed, improved and forever maintained as public highways by the state of Minnesota." To finance the project, the legislature is authorized to issue and sell bonds, these bonds to be retired by the proceeds of an increased tax which is to be levied on all motor vehicles. The amendment limits the issue of bonds in any calendar year to \$10,000,000 par value and provides that never shall there be more than \$75,000,000 in bonds outstanding.

The tax which will be levied on motor vehicles will be in the form of a graduated license fee, ranging from approximately \$10 a year for Fords to \$15 to \$20 for medium priced cars with the average fee at \$18. This will be in lieu of the present license fee of \$1.66 and the personal property tax on automobiles which, according to the Minnesota Tax Commission, averages \$5.60 per car. Should the legislature decide on a license fee which would average less than \$18, there is provision for a corresponding reduction in the amount of bonds which may be issued so that in any event the bond issue will be such as may be retired by the motor vehicle tax.

Adjusts Burden of Costs

One of the outstanding features of the plan is its effect on secondary or feeder roads. Based on the average of the last two years, the local government funds available for road work amount to \$10,925,000 annually. Babcock estimates, however, that 80 per cent of the money spent on road improvement and

construction in Minnesota goes into the main or arterial highways, the class which his plan removed to state jurisdiction. This will relieve the counties and townships of the enormous burden of caring for these arterial highways and will leave these units free to apply their funds to purely local roads. For the ten year period which the state highway commissioner estimates will be required to complete the system, these local funds will amount to a total of \$109,250,000, all of which can be devoted to feeder or secondary roads. Computing this construction of graveled roads at \$5,000 a mile, this will mean 21,850 miles of improved secondary roads.

Non-Partisan League Objects

The Babcock amendment in the campaign was accorded the unanimous and enthusiastic support of automobile dealers and clubs, civic bodies, all good roads organizations and the women's clubs over the entire state. "Lift Minnesota out of the mud" became the slogan of all who were interested in the greater Minnesota which the plan made possible. The economic advantages which would accrue from the plan, its advertising value to the "State of 10,000 Lakes," the advantages to the farmer—all these were brought to the attention of the voters by the newspapers and speakers for the amendment. Full page advertisements and editorials appeared in the leading papers of the state and in the larger cities, advocates of the Babcock amendment staged monster parades to drive home the necessity for its support at the polls. The only opposition to the project came from the Non-Partisan League.

Buy as Needs Require, Advises Bank Head

MILWAUKEE, Nov. 15—Milwaukee bankers are co-operating with retailers in all lines in a three-weeks' campaign of education of the public as to the fundamentals of present conditions in relation to purchasing, and excerpts of the statements made by the bankers will be used as parts of local newspaper advertisements by dealers in automobiles, tires and accessories just as they will be used by dry goods merchants and grocers. The First Wisconsin National Bank has offered its facilities for the purpose of centralizing the entire effort.

An initial shot in the campaign was an interview given by Oliver C. Fuller, president of the bank. He said: "It is too much to expect the return of 1914 prices. We are doing very well to have a price level which is about that of the beginning of 1917. Not in a generation have prices taken so much of a slump in so short a period. It was only natural that when the decline began, purchasers should hold off for lower prices. But who knows whether the decline will continue, or if the scarcity caused by low production due to a refusal by the public to buy, may not cause a renewed upward trend? The wise buyer will not speculate either in the rise or fall of prices, but buy as needs require."

Investigation Shows Public Favors Cars

Failure to Buy Ascribed to Lower Price Influence and Bank Prejudice

NEW YORK, Nov. 15—Slow but steady improvement in the retail sales of automobiles with a general upward trend in the business was disclosed by a survey of the country made last week by the H. E. Lesan Advertising Agency of this city and Chicago.

The information, obtained from various sources almost entirely foreign to the merchandising of motor cars, coincided almost exactly with the surveys supplied AUTOMOTIVE INDUSTRIES by its correspondents in the leading distribution centers of the country. The two together offer indisputable testimony that sales resistance is weakening so far as passenger cars are concerned.

This was the telegram sent out:

"Many present and prospective automotive advertisers anxious learn prospects automotive business immediate future independent usual dealer and business connections. Could you have reporter interview few citizens various lines occupation and wire night letter giving their opinion effect of recent price changes on immediate sales, possibility consumer buying this year and outlook for next year. Also opinion your automobile editor on subject. Real facts desired, agreeable or disagreeable."

Here is a summary of the replies:

"Replies confirmed the prejudice of bankers against the industry but showed that this prejudice is not shared by the public. Varying effect of initial price reductions was indicated, but the belief prevails that, initial reductions having been made, that general and even further reductions or guarantees against them are necessary to restore full confidence in respective buyers. A gradual but steady resumption of buying on individual cars has been noted where buyers are satisfied on this score, reducing dealer stocks, which should soon be felt at factories. Many comment on the fact that manufacturers, dealers and salesmen must overcome the demoralizing influence of the past sellers' market and get down to a business basis with real work and genuine service. Reports are almost unanimous that general business conditions are fundamentally sound and that the country is only going through a necessary period of deflation after which business will be normal at new prices.

Cars Necessary to Public

"The reports said that motor cars are as necessary to the public as anything else and that the volume of business at the new price levels should furnish considerable trade yet this year, get to normal by early spring and be as large next year as this if the industry is prompt in making decisions, quick in action and aggressive in salesmanship."

Goodyear Financing Based on Inventory

All Finished Stock Assigned as Security—Pass Dividends for First Time

AKRON, OHIO, Nov. 13—Official announcement was made to-day by the Goodyear Tire & Rubber Co. that the program of refinancing to the extent of \$25,000,000 had been consummated successfully with a group of leading American banking interests headed by the Goldman, Sachs Company of New York. This is the first official word coming from Goodyear relative to its refinancing and confirms the announcement in AUTOMOTIVE INDUSTRIES that the company had practically unlimited funds at its disposal. Under the new financing program Goodyear inventories of finished product are assigned to the financing interests as security. The arrangement places no incumbrances on the Goodyear plant or equipment, it is officially announced, and will in no way affect the ownership or management of the company's business. The refinancing does not affect the Goodyear company in California.

In an official statement issued to-day by the company to all its division and branch managers, L. C. Rockhill, general sales manager, says:

"We have seen our sales dropping off because automobile and truck manufacturers were cutting production and because dealers were reducing stocks and refraining from the usual stock replenishment. As business continued to decline it became necessary for us to reorganize our sales force and to assign many executives to more definite sales tasks and to enlarge territories so that we could operate with reduced sales personnel. The reorganization plan has now been perfected and we have just arranged with a group of banking interests to supply us with \$25,000,000 of additional finance which will be adequate to carry us over the period of depression.

No Encumbrances on Plant

"Naturally banking interests require security for the funds they are advancing to us and this has been arranged in an admirable manner by assigning to them our inventories of finished product. This arrangement places no incumbrances on our plant or equipment and in no way affects the ownership or management of the business. Arrangements are being made covering the handling of stock under the new financing plan but there will be no interruption in the facilities of our sales department for making prompt deliveries to customers.

"We will be able to meet our obligations promptly and we can proceed to pursue sales with confidence that when this period of depression is past the prediction we made four months ago will come true—that Goodyear would emerge from the period in a stronger position in

the trade than ever before. The company now is in a more secure position than it has been for months and there are plenty of assets back of every share of stock in the company."

This announcement comes close upon the heels of the action of the directors Saturday in passing the regular quarterly dividend on the common stock for the first time in the history of the company. Goodyear outstanding common stock exceeds \$61,000,000 and the outstanding preferred stock approximates \$59,000,000. Action on the regular quarterly dividend on preferred stock will be taken in January. The common paid 12 per cent annually up until the last meeting when the dividend was reduced to 10 per cent. The directors issued the following statement after the meeting:

Stockholders to Get Letter

"At the meeting held to-day it was decided by the directors that in view of the present financial and business conditions and in order to conserve the cash resources of the company it is inadvisable to declare the usual quarterly dividend on the common stock payable on Dec. 1, 1920. A letter is being prepared and will be mailed to the stockholders in a few days setting forth the condition of the company's business and assuring the stockholders as to the soundness of their investment."

Westcott Sales Heads Push Sales in Field

SPRINGFIELD, OHIO, Nov. 13—It is announced at the plant of the Westcott Motor Car Co. here that reports from sales-managers in various sections of the country show an increased demand for cars. Lately there have been good sized shipments leaving the works. Export orders were filled during the past week for Richardson, Orr & Co., of New Zealand, distributors for the Westcott company in that territory.

General Sales Manager E. H. Gilcrest is making a trip through the West visiting Westcott distributors. After stopping a few days in Chicago he will go to Omaha, Denver, Salt Lake City and other points on the west coast. He will meet E. H. Kron, sales-manager for the Pacific coast, at Salt Lake City. They will make the trip together, visiting the western cities. W. A. Hinchman, of Springfield, southern sales-manager, has left on a trip through the southern territory, after spending several days at the factory. C. F. Vincent, district service manager, who has been at the Westcott plant, has also left on a southern trip.

DODGE CONTINUES SCHOOL

DETROIT, Nov. 12—The Dodge Bros. service school, which is maintained for the benefit of dealers who are interested in having their service heads become better acquainted with factory service methods, is to remain in operation all winter. The course lasts one week and covers timing, storage battery, reborning, generator, ignition, engine, carbureter, clutch, gearset and steering gear.

Overland to Reopen Parts Department

Deny Significance in Sale of Willys-Earl Homes in Toledo —Inventory Progresses

TOLEDO, Nov. 15.—W. H. Kilpatrick, vice-president in charge of production at the Overland plant here, said to-day that the reopening of the parts department to-morrow or Wednesday, putting 2000 men back at work was sufficient response to reports that the factory would be closed indefinitely. He said the entire plant would be in operation again as soon as inventory was completed.

Kilpatrick added that the inventory was started in the parts department because of demand for parts from dealers all over the country. Day and night shifts are working to complete it so that the work of checking up other departments can be undertaken as quickly as possible.

Officials at the plant denied that there was any significance to the fact that the homes here of John N. Willys, president of the Willys Corp. and C. A. Earl, vice-president of the Willys-Overland Co., have been offered for sale. Toledo is full of rumors about the future of the Willys interests but no particular foundation can be found for any of them. The one most frequently heard is that Willys will take over the Maxwell and Chalmers companies. The only color which can be found for this is that Walter P. Chrysler and John R. Harbeck, who head the Maxwell-Chalmers management committee, are high in the Willys councils. Officers of the Overland company declare they are tired of denying rumors of impending changes.

FAMOUS TRUCK BOOKS MISSING

DETROIT, Nov. 15—At the initial meeting of creditors of the Famous Truck Co., Inc., of St. Joseph, Mich., it developed that the court had been unable to procure books or records showing the amount of stock sold or the names of stockholders. It is reported that between \$100,000 and \$200,000 worth of stock in the company was disposed of. Appraisal of the assets showed \$22,788.80 against an indebtedness of \$89,254. This latter, however, does not represent the loss to stockholders.

F. H. BALL DIES

DETROIT, Nov. 15—F. H. Ball, president and general manager of the Ball & Ball Carbureter Co., died Saturday after an illness of two months. He was known widely in the engineering field by his connection with the development of the high speed engine prior to engaging in the carbureter business. He organized the Ball Engine Co., Erie, Pa.; the Ball & Wood Engine Co., of Elizabeth, N. J., and the American Engine Co., of Bound Brook, N. J., prior to coming to Detroit. He had been in the carbureter business ten years.

Dodge Plant Closes to Adjust Activities

Will Vary Operations from Week to Week as Conditions Warrant

DETROIT, Nov. 17—Operations at the Dodge plant came to a halt last night for the balance of the week to permit of readjustments. The order closing the plant for four days of this week, declared General Manager Haynes, would be followed by a similar order next week and for other weeks thereafter until necessary adjustments and alterations are made.

Coming on the heels of the dealer conference which the company has just held the action of curtailing production to a two-day a week basis is causing much comment. Manufacturers had anticipated that the close of the conference would witness a curtailed schedule but an actual closing for any part of the work week was not expected.

Haynes denied that only men with dependents would be employed and said Dodge, like other plants, would cull out the weaklings and inefficient. With these disposed of greater favor would be shown in employment to those men with families. The factory was about 15 per cent over-manned, he said, owing to the former absentee percentage being converted to steady attendance through fear of dismissal in the depression period.

Dodge has been employing about 24,000 workers for the past two months. About 6000 would be forced out of work through the elimination of excess labor, Haynes said. As to the two-day week, he said this was not definite but that the factory would be down a few days each week indefinitely until adjustments were completed.

In October Dodge, with Ford and Buick, were the only plants in the Detroit district to maintain a semblance of normal production.

Buick Cuts Production, Adopts Six-Hour Day

DETROIT, Nov. 17—Buick Motor Car Co. has reduced production from 540 cars a day to 350, and will operate temporarily on a six-hour day basis. The company's announcement to its employees said it had adopted the shorter work day as affording the greatest good to the greatest number during the time of lessened production. Further reductions in the organization will not be made unless conditions which control the general manufacturing and selling situation make them imperative.

Curtailment of production was made necessary, the company said, to meet the business emergency and readjustment affecting all industry. By spreading the production over the greatest extent of the organization it aimed to reduce the discomforts of the readjustment to a minimum. Hope is expressed in the an-

nouncement that conditions dictating the reduced output will be overcome by the close of the year.

Cadillac has not been affected and is running on the schedule of 20,000 cars in 1920 which was laid out eighteen months ago. Officials report that the demand continues to exceed the supply and if there are no cancellations the company will enter the new year with practically 5000 cars signed up. In a few months the new Cadillac plant providing for an output of 33 1/3 per cent higher than the present factory will be opened. It is expected to build 27,000 cars a year.

White Motor Elects New Board Chairman

CLEVELAND, Nov. 15—Homer H. Johnson of Cleveland, head of one of the best known law firms in the Middle West, has been elected chairman of the Board of Directors of the White Motor Co. He will take the place made vacant by the death of his law partner, M. B. Johnson.

Johnson was chosen a director of the White company last week, and then came his elevation to the chairmanship of the board. He was active in war work until recently, having served for a time as fuel director for Ohio, and subsequently went to France as a member of the American Liquidation Committee.

At the meeting at which Johnson was chosen for the important post, the directors declared the regular quarterly dividend of \$1 a share, payable Dec. 31. There has been practically no change in production at the White company plant, despite a general slowing up of industry in this city. The company continues to work a day and night shift in the manufacture of motor trucks. Continuity of employment is one of the cardinal policies to keep down labor turnover.

Schroeder Quits Army to Make Flowmeter

DAYTON, OHIO, Nov. 17—Captain R. W. Schroeder, of the air service, noted as holder of the world's altitude record for airplanes and pilot of the American Air Service Entry in the Gordon-Bennett airplane race, has been discharged from the army.

Captain Schroeder will enter into the manufacture of the Schroeder Flowmeter perfected by him while at McCook Field. He will be associated with a manufacturing concern in Chicago which has undertaken the development and marketing of his device. The unit is a vertical type to be mounted on the dash and reads directly in miles per gallon fuel consumption.

BULL TRACTOR PLANTS SOLD
INDIANAPOLIS, Nov. 16—Property of the Bull Tractor and the Madison Motor Car Co., including the plant at Anderson, Ind., was sold here to-day for \$120,000 to L. Goldstein's Sons, of Philadelphia, owners of the American Motor Parts Co. Besides the real estate and buildings at Anderson the sale included the motor parts of the tractor and motor companies there and at Minneapolis.

Nelson Asks Ruling on Indebtedness

Reorganized Company Files Bankruptcy Petition to Straighten Out Standing

DETROIT, Nov. 12—The E. A. Nelson Motor Car Co., which recently was reorganized as the E. A. Nelson Automobile Co., a Delaware corporation, filed a petition in bankruptcy in the Federal Court to-day listing liabilities of \$73,166.65 and no assets other than personal property of undetermined value. Of the total indebtedness \$66,946.52 represents unsecured claims and the petition lists among other debts approximately \$5500 due the government as taxes on automobiles manufactured and approximately \$720 city and county taxes.

Among the unsecured creditors are the Burton Lowery Co., Detroit; Fulton Drop Forge Co., Ohio; Michigan Metal Stamping Co., Detroit, and McCord & Co., Chicago. Notes aggregating \$17,901.75, all payable through the National Bank of Commerce, include two payable to the Turner Moore Mfg. Co., amounting to \$8,012.12; two payable to the Burton Lowery Co., aggregating \$4,270.60; the Buffalo Pressed Steel Co., \$2,743.55 and the United States Light and Heat Co., \$1000.

Officials of the company said to-day the petition was filed with the view of having the court fix liability for the indebtedness between the old and new company and declared the present company would continue operation as soon as the court had rendered its decision. The petition was filed by E. A. Nelson, president of the E. A. Nelson Motor Car Co., who was succeeded by J. A. Hibbard when the reorganization was effected. An agreement dated March 23, 1920, assigning 52,000 shares of stock in the E. A. Nelson Motor Car Co., to the E. A. Nelson Automobile Co., is referred to in the petition.

The former company was organized four years ago but encountered financial difficulties in the early part of this year, at which time the liabilities were assumed by the reorganized company under the terms of the stock agreement.

RACE REGULATIONS FIXED

LONDON, Nov. 8 (*Special Correspondence*)—Regulations have been announced for the international tourist trophy races which will be held next year under the auspices of the Royal Automobile Club. There will be two contests with one day devoted to each. They will be for standard cars fitted with engines of 3000 cu. cm. (183 cu. in.) and 1500 cu. cm., respectively. The club also is preparing to consider the advisability of holding a fuel and oil consumption test but it is suggested that this should be held apart from the actual races. The contests will be run on the Isle of Man in June and the distance will be about 300 miles.

Rail Service Cut as Trucks Increase

Efficiency of Short Haul Service Shown on Delaware-Maryland Peninsula

WILMINGTON, DEL., Nov. 15—The aggressiveness of the motor truck engaged in commercial traffic between Philadelphia, Wilmington, Baltimore and the Delaware-Maryland peninsula has caused the Pennsylvania railroad to curtail its way freight traffic on the peninsula. Heretofore, except during the war, when it was possible, these trains were operated daily to accommodate the traffic between the cities and the rural section, but motor truck lines have begun to operate all over the peninsula, with the result that the railroad company has announced that hereafter way freights will be operated only every other day.

Regular motor trains of trucks ply between Philadelphia, Wilmington, Baltimore and the territory down the peninsula, which comprises all of the State of Delaware and the eastern shore of Maryland. Started in a small way, this traffic has developed to such an extent the railroad cannot profitably compete.

This traffic applies not only to shipments from the country to the city, but also to the shipments from the city wholesale houses to the country. Then again, by the time a retailer pays his freight and cartage from the railroad station, he is usually paying more for the goods than they cost delivered at the door by the wholesaler's truck.

Traffic Bureau Plan Rounded Out by N.A.C.C.

NEW YORK, Nov. 15—Considerable progress is being made by F. W. Fenn, secretary of the motor truck committee of the National Automobile Chamber of Commerce, in his campaign to have a transportation committee included in the organization of every Chamber of Commerce in the United States.

This committee, as proposed by Fenn, would be composed of one or two manufacturers, a prominent railroad official, a motor transport operator and one or two farmers. If the city is located on a waterway a marine transport operator would be included in the membership. Attached to the committee would be a traffic manager and a farm secretary.

It would be the duty of the farm secretary to co-operate with farm bureaus for the development of outlying rural districts to insure a market for the farmers' products and thereby increase production. New markets would be opened by the use of motor trucks. One phase of the work of the committee would be to find work for trucks and establish tariffs which would insure the confidence of shippers.

Short haul, less than carload lot business, would be separated from the long haul business.

Tokio's Manless Rickshaw

WASHINGTON, Nov. 13—The "jinricmobile" has made its appearance in Tokio. It is the body of a "rickshaw" with a motor in it, possibly the tiniest automobile for everyday utility in the world. It fits as snugly in the narrower streets of Tokio as the "kuruma" itself—that being the Japanese name for "jinricmobile."

The innovation is called the "motor kurumaya." It makes it possible for the coolie to ride as well as his fare and permits of far greater speed. The manless rickshaw has its motor on the ground under the seat.

New York Truck Show to Stress Highway Use

NEW YORK, Nov. 13—Motor truck manufacturers are exhibiting great interest in the Highway Transportation Show Jan. 3 to 8, because of the effort being put forth by the show committee to make the exhibition one of great educational value and quite different from all previous still motor truck shows. Many circus stunts and contests will be staged and prominent speakers obtained to draw attendance. Emphasis is being made that it will be a Highway Transportation Show instead of a mere motor truck show.

Each day of the week has been set aside to cover one important phase of highway transportation, both in the exhibits to be featured and in the selection of speakers. Monday, Jan. 3, will be known as Opening Day; Tuesday, Army Day; Wednesday, Motor Accident Prevention Day; Thursday, Transportation Day; Friday, Farmers' Day, and Saturday, Motor Truck Association Day.

NEW YORK TO CLEAR STREETS

NEW YORK, Nov. 16—The city of New York has prepared on a large scale for snow removal work throughout the coming winter and will rely upon motor trucks and tractors principally to do the job.

The city has appropriated \$2,757,000 for equipment and \$1,370,000 for garages to house it. The new equipment, most of which has already been purchased, includes 212 5-ton White trucks, 100 2-ton Mack trucks, 150 4-wheel pull plows, 300 push plows, to be attached to the front of the trucks or tractors; 100 2-ton Cletracs, 50 4-ton Holt caterpillar trucks, three wrecking trucks, equipped with cranes; four ¾-ton delivery truck, and one mechanical snow loader.

As to old equipment, the city has 38 5-ton trucks, 500 department carts, 200 push plows and minor equipment.

Last winter the city's unpreparedness to fight the snow cost \$60,000,000 in delays and lost business. In preparing to combat snow obstruction the city has been supported by every business interest.

Packard Increases Earnings for Year

Surplus After Dividends \$3,884,027—Stockholders Get \$2,511,441 During Year

NEW YORK, Nov. 15—Packard Motor Car Co., for the fiscal year ended Aug. 31, 1920, reports net profits, after charges and taxes, of \$6,395,468, equivalent, after preferred dividends, to \$4.51 a share earned on the \$11,885,100 common stock (\$10 par value). This compares with net profits of \$5,433,634, or \$41.15 a share, on the \$11,840,930 common stock (\$100 par value) in 1919.

Consolidated income account for the year compares as follows:

	1920	1919
Net profits, after tax	\$6,395,468	\$5,433,634
Dividends	2,511,441	2,099,244
Surplus	\$3,884,027	\$3,334,390
Net profits, after tax	\$5,616,707	\$5,400,691
Dividends	1,270,388	1,470,636
Surplus	\$4,346,319	\$3,930,636

The balance sheet as of Aug. 31, 1920, compares as follows:

	1920	1919
ASSETS		
Property investment	\$21,988,430	\$15,934,393
Cash in sinking fund for retirem't prefer'd stock		270,000
Inventories	29,359,327	18,051,749
Accounts receivable	4,882,189	4,401,718
Defer'd installm't notes and bill's receivable	1,352,728	338,162
Miscellaneous investments	207,535	173,973
Liberty bonds and U. S. certificates of indebtedness		19,583,668
Liberty bonds purchased for employees, less amounts received		313,158
Cash	4,314,810	3,409,248
Deferred charges	703,258	562,142
Total	\$62,808,277	\$63,098,216

	1920	1919
LIABILITIES		
Preferred stock	\$15,223,500	\$15,500,000
Common stock	11,885,100	11,840,930
Notes payable	5,000,000	5,000,000
Accounts payable and payrolls	4,087,549	4,846,370
Federal inc. and profits taxes, etc	3,354,456	8,284,796
Reserve for possible shrinkage value materials, etc	2,500,000	
Profit and loss surplus	20,757,672	16,992,250
Total	\$62,808,277	\$63,098,216

McLAUGHLIN HEADS A. I. C.

TORONTO, Nov. 12—R. S. McLaughlin, president of General Motors of Canada, Ltd., and W. T. Sampson, president of Gananogue Spring & Axle Co., Ltd., were elected president and vice-president respectively of the Automotive Industries of Canada (the National Automobile Chamber of Commerce of the Dominion) at the annual meeting of the association held in Toronto to-day.

Credit Stimulates Buying of Tractors

International's New Policy Brings Increased Sales In Louisiana

NEW ORLEANS, LA., Nov. 12—The New Orleans branch office of the International Harvester Co. already is feeling the effect of the change from cash to term credit sales of tractors and other farm machinery to farmers of Louisiana and southern Mississippi, according to S. E. Foster, assistant manager, in charge of the local branch. This, the first break in the International's policy of demanding cash for farm power equipment, was announced beginning Nov. 1, and was almost immediately followed by another announcement that if there is any reduction in tractor or equipment prices between now and May 1, 1921, the purchasers of such tractors and equipment before the first of May will be given the benefit of such decline.

"This is not, however, to be taken as an indication that there will be any decline, because we do not expect any," said Mr. Foster.

"An instance of what the use of power equipment can do to stabilize an industry, especially the agricultural industry of a community," Foster continued, "was given when many farmers in southern Louisiana lost their mules from charbon this spring. Many of them wrote in, and told others as well, that they would have been at a standstill, would have been unable to do their spring cultivating and planting, and would have harvested no crops at all, if it had not been for tractors. This started 'tractor infection' in southern Louisiana. When we once get a tractor in a community, and doing good work, the use of tractors spreads like hay fever and the farmers all around begin to want tractors. Now that they can get these tractors on easy terms, with light interest on deferred payments, I expect a big increase in the sales, especially of small tractors, to small farmers, to those who really need such improved machinery, but have been unable to get it so far, owing to the all-cash payment."

MAGUIRE JOINS HARE MOTORS

SPRINGFIELD, OHIO, Nov. 15—Peter W. Maguire, who has been treasurer of the Kelly-Springfield Motor Truck Co., left to-day for New York, where he will become identified with the Hare Motors Corp. He will hereafter be known as special representative. Maguire's first work will be to assist in the consolidation of the retail sales outlets of the Kelly company and the Hare corporation.

TO ASSEMBLE TRUCK BODIES

LANSING, MICH., Nov. 15—The United Automotive Body Co. of Springboro, Pa., has leased a building in this city to be used as a body assembling

plant for furnishing truck bodies to the Reo and Oldsmobile factories. The building contains 27,200 sq. ft. of floor space and the company plans also to assemble Ford bodies here. Establishment of the assembling plant and warehouse here was decided upon to obviate the necessity of indefinite delay when the factories were compelled to await delivery of bodies from the company's plants in Pennsylvania and Greenfield, Ohio.

Michigan Prepared to Keep Roads Clear

DETROIT, Nov. 15—County road commissioners, truck factory officials and automotive executives formulated plans for keeping the roadways of southeastern Michigan free from snow during the next six months at a meeting in the rooms of the Detroit Automobile Club in Hotel Tuller. The work is to be undertaken on a co-operative basis by county authorities and truck manufacturers. Snow plows attached to the front of motor trucks will form the principal part of the snow removing equipment. In emergencies labor from truck factories will be furnished to aid county employees. All the truck lines in the southeastern section are included in the list to be worked continuously.

A committee to have charge of the work consists of G. C. Dillman, of the State Highway Department; E. J. Strong, Buick Motor Co.; B. C. Foy, Reo Motor Car Co.; K. N. Moore, National Automobile Chamber of Commerce; R. W. Roberts, State Highway Department; F. E. Beard, representing St. Clair county; and J. L. Richards, B. C. Tiney, and R. B. McPherson, representing Lenawee, Monroe and Livingston counties respectively.

PONTIAC DISSOLUTION ASKED

PONTIAC, MICH., Nov. 15—Dissolution of the Pontiac Body Co. is asked in a petition filed by George A. Brown, N. H. Parker and A. W. King, three of four directors. The action is for the purpose of winding up the company's affairs and disbursing \$20,000 held in bank to the company's credit and \$7,778.90 due from the General Motors Corp., which purchased the body company last October.

The company was organized in 1910 as the Monroe Body Co., and the name was changed in March, 1919. There has been a partial disbursement of the assets since the sale to General Motors and the nineteen stockholders interested are seeking final settlement.

JACOB WERTHEIM DIES

NEW YORK, Nov. 15—Jacob Wertheim, who had an active share in the development of the automobile industry and was at one time a director of the General Motors Corp., died at his home here yesterday at the age of sixty-two. He retired from business in 1913 but continued to take an active part in Jewish charities. From a humble beginning he became the head of the largest independent cigar manufacturing company in this country.

Predict Big Market to Open in Mexico

Texas Dealers Report Cars and Trucks Necessary for Recon- struction Now Starting

EL PASO, TEXAS, Nov. 12—As a result of the improved conditions in Mexico the automobile and motor truck trade in that country shows a wonderful increase, according to El Paso dealers, four of whom have just returned from a trip of investigation of trade prospects in several of the larger cities of that country. In this party were E. G. Perry, Lone Star Motor Co., F. M. Bannell, El Paso Overland Co., O. C. Youngblood, Pry Motor Co., and Sam Watkins of the Watkins Motor Co.

"The most striking thing in Mexico at the present time is its automobiles," said Bannell. "Few fine cars are to be seen. Of course there is a call for American capital, but that will be forthcoming. I look for the recovery of Mexico in shorter period of time than any country has ever recovered from like conditions. Our Mexican territory covers the State of Chihuahua. H. W. Klett, Mexican representative of the John N. Willys Export Corp. will arrive here soon, and we hope to go over the Mexican situation immediately. In fact, we have a carload of Overlands sold in Chihuahua now, but cannot move them. Conditions are undoubtedly better than ever. All classes are united for a speedy rehabilitation of our sister republic."

"There is a great opening for trucks in Mexico," said Perry. "Many mines situated many miles off the railroad make a big demand for heavy trucks. I look for a speedy recovery of Mexico and an enormous demand for American automobiles and trucks. In fact, that demand is now evident."

Need Cars for Reconstruction

"The need of automobiles and trucks in the reconstruction of Mexico is evident to any traveler through the southern republic," said Youngblood. "It is not a case of selling cars but of getting the cars to them. American capital must and will play its part. Our territory in Mexico is the State of Chihuahua. We are preparing to establish four agencies at an early date. I expect to see a prosperous Mexico in a remarkably short time."

"The demand for automobiles and trucks in Mexico was quite evident to all members of our party. They will both play a very prominent part in putting Mexico on her feet." This is the opinion of Sam Watkins. "Right now it is merely a question of getting automotive machinery to the Mexican people and the sooner we get there the sooner additional large orders will be forthcoming. It is up to us to help, which is being done rapidly by El Pasoans and others and which it is quite evident Mexico fully appreciates."

Chamber Predicts Lower Price Level

United States Commerce Organization Expects No Financial Crash, However

WASHINGTON, Nov. 12—Further reduction in prices is anticipated in a report of the committee on statistics of the Chamber of Commerce of the United States, which covers business conditions for October. No marked financial disturbance is in sight, despite expressions to the contrary in certain quarters, the committee pointed out.

"Just now the need of the country seems to be for more consumption rather than more production," Archer Wall Douglas, chairman, announced. "Talk of stabilizing prices, so as to save the situation, no longer interests any one save a few hopeless theorists. The laws of supply and demand will in time regulate matters.

"Theories of great and startling changes in the framework and organization of manufacturing life are dying out in view of the exigencies of the occasion as to how to maintain adequate production at reasonably remunerative prices. Industrial life, in time, will doubtless be more democratized than at present, but we are not headed in the direction of running factories by committees.

"The entire commercial world is setting its house in order by reducing commitments, collecting outstanding accounts, and bringing down stocks of merchandise to the requirements of reduced demand. And it is all being done soberly and advisedly. All are awaiting that psychological time, the first of the year, when the current of events and the general trend shall be more readily discerned and more easily interpreted. Meanwhile, much definite action is being postponed. Merchandise stocks in general will then be far less than for several years."

PATCH TO MAKE TRACTOR

STEVENS POINT, WIS., Nov. 15—A. J. Patch, formerly chief engineer of the Hart-Parr Co., Charles City, Iowa, has organized, in association with a number of prominent Wisconsin business men, a new corporation known as the Farmers' Tractor Corp., with an authorized capitalization of \$500,000. It has selected Stevens Point, Wis., as headquarters, and next spring will build a machine shop and assembling plant, later adding a foundry. William Mainland of Oshkosh, Wis., is assisting Patch in the organization. The new tractor will be known as the M. P. M.

FORM SMITH BATTERY COMPANY

ATLANTA, Nov. 12—The F. V. L. Smith Battery Co., manufacturers, has been organized and incorporated in Atlanta with a capital stock of \$300,000. A charter has already been obtained and

preparations are now under way for the construction here of a large plant to manufacture electrical batteries. The plant is to have a production capacity of 1000 batteries per day and will establish a chain of service stations all over the South. J. W. Moore, president of the Atlanta Utility Works, was named vice-president, and S. L. Manson, an official of the American Telephone and Telegraph Co., was named secretary. Offices have been opened in New York

Canadian Ford Claims Share of Indian Trade

FORD, ONT., Nov. 15—Canadian Ford motor cars formed over 50 per cent of the total imports of motor cars into India in the past fiscal year. Ford Motor Co. of Canada, Ltd., comments on India's imports of motor cars as follows:

"We notice that the United States is credited with having shipped 9353 of the 9925 motor cars imported into India during the twelve months ending March, 1920. We had considerable correspondence with the Customs authorities and the statistical offices in India regarding the showing of Canadian shipments as separately from the United States. For some reason or other all Ford cars shipped into India up to the present time have been listed as American cars, when they actually are Canadian-made.

Unfortunately, a number of them have been shipped from the port of New York, owing to our inability to secure ocean space on steamers leaving Canadian ports. Nevertheless, the origin is British, and we would like due prominence to be given to this fact. As a matter of fact, during the period under review we manufactured in our plant at Ford, Ont., and shipped direct to India, either through the ports of Montreal or St. John, Canada, or the port of New York, 5532 Ford cars of all models.

Pennsy and Gordon Reduce Tire Prices

NEW YORK, Nov. 17—Price reductions have been made by the Pennsylvania Rubber Co. and the Gordon Tire & Rubber Co., the former with factories and general offices at Jeanette, Pa., and the latter at Canton, Ohio. Reduction in each case are on both cord and fabric tires and on tubes.

The Pennsylvania cuts are approximately 3½ per cent on cords; 7½ per cent on fabrics, and 8½ per cent on tubes.

The Gordon reductions are about 14½ per cent on tubes; 15 per cent on fabric tires, and 17 per cent on cord tires.

TIRE MARKET IN SUMATRA

WASHINGTON, Nov. 12—Sumatra offers a good market for automobile tires, according to a report received from the American consul to-day. Over 2000 motor vehicles have been licensed in the Medan consular district and tire imports amounted to \$200,000 in 1919. Statistics for the first-half of this year show a decided increase in imports.

METAL MARKETS

REGRETTABLE though it may be, candor compels the statement that the iron and steel markets have not yet reached that sackcloth and ashes period of repentance when buyers would be justified in having compassion with mills left without any backlog of orders. The market appears to be a buyers' affair only if they stay out of it for the present. This is especially true of the pig iron situation, which would adjust itself speedily to the changed order of things were it not for the Bourbon attitude of a number of leading factors who preach in their weekly market reports the early advent of a "revival," by which they mean a return to pre-slump levels for pig iron. In spite of all the assertions that pig iron can not be made and sold at around \$35 to-day, once buyers show that they will not pay more than that level it will be made and sold for that price. The copper market furnishes the best proof of this. When the red metal declined to below 15c., there was loud gnashing of teeth that with average producing costs at around 18c. no producer could mine and refine copper profitably in a 15c. market. And now we find that some of the producers frankly admit that they can make a reasonable profit in selling their red metal at 15c. The Calumet & Hecla has set the pace for the other copper producers by lopping 15 per cent off wages and salaries. In conditions such as those that now confront American industry, it is an established economic axiom that the market price always is that of the lowest cost producer. And that is exactly what will come to pass in the pig iron market. A few furnaces will have the courage to prune down their costs and the others will have to follow. Meanwhile, however, come complaints from Middle West foundries specializing in automotive castings that collections are dishearteningly slow. It is obvious that the automotive industry will benefit itself by placing these foundries in a position to avail themselves of bargain offers of pig iron, when opportunities to take on low-priced pig materialize. In the market for semifinished and finished steel the process of equalization on the basis of United States Steel Corp.'s prices progresses slowly but surely.

Pig Iron—Valley foundry iron has been offered at as low as \$40, furnace, but remembering that a year ago the market was about \$10 lower and that many commodity prices have receded to the late 1919 levels, foundries are almost a unit in holding off.

Steel—Closing down of the United Alloy Steel Co.'s plant emphasizes the utter absence of demand for alloy steels in automotive manufactures. Cold rolled steel makers are also minus orders for want of automotive inquiries. It is expected that a Detroit manufacturer of medium-priced passenger cars will put out inquiries shortly for 14,000 tons of sheets for first quarter delivery.

Aluminum—The market is lifeless. Importations of sheets and ingots continue to add to the supply, but domestic output has been greatly curtailed. Broader use of aluminum in automotive castings is portended by continually successful laboratory experiments.

Lead—The price of lead was further reduced Wednesday to \$10 a ton when the American Smelting & Refining Co.'s quotation became operative. Prices of 6½ cents New York and East St. Louis were the lowest since October 1919. Outside market rules about ¼ cent lower.

Tin—Some consumers bought Straits at around 36c. The market is quiet.

INDUSTRIAL NOTES

Ideal Engine Co., Lansing, Mich., has purchased the plant of the Lansing Body Co. and will use it in the manufacture of power lawn mowers by the Ideal Power Lawn Mower Co. The power lawn mower is the result of efforts of R. E. Olds and Fay M. Seeley, who spent much time developing a small tractor to push three 30-inch mowers to supply a demand from city parks, country clubs and golf clubs.

Yates & Johnson Mfg. Co., Chippewa Falls, Wis., organized a year ago to engage in the foundry and machine shop business, has changed its corporate style to Northlite Mfg. Co. and increased its capital stock from \$25,000 to \$100,000. It is erecting plant additions and will put in production, besides gas engines, a new design of electro-generating unit for isolated places.

American Bosch Magneto Corp. has enlarged its sales personnel both at the main plant and at its branches. T. C. Miller has been made sales manager for the Eastern district, W. G. Brown for the Western district and M. Tost for the Central district. The staff of the general sales department has been augmented by the addition of four new men.

Master Tire & Rubber Co., Dayton, Ohio, has started production of a one-size cord tire for small cars. Through specializing on this one size, the company expects to greatly reduce operating costs. One unit is now working and another will be added in the Spring. When operating fully the company will make 2000 tires daily.

Ames Carburetor Co. is the new style adopted by the Hexmen Moto Co. of Racine, Wis., which was established a year ago to manufacture a new type of auxiliary carbureting device for internal combustion engines. The company has developed carbureters as well as the auxiliary device.

Martin-Parry Corp. has opened branches in New York and Atlanta to make distribution more readily. Each branch carries a full line of bodies and plants. E. A. McGrew is in charge of the New York branch and R. G. Seibert the Atlanta.

Goodluck Rubber Co., Buffalo, has arranged to purchase the right to manufacture Climax tubes and Mexo tires in New York State. Climax Rubber has acquired a plant in Delaware which will be used to manufacture Mexo tires.

S. W. Merritt Co., which recently increased its capitalization from \$100,000 to \$1,100,000, will soon start production of its new farm light plant. Present plans call for the manufacture of 1500 plants in 1921.

Waltham Watch Co. has laid off two hundred employees in the clock and speedometer departments due to the slump in the automobile business.

Armorcord Rubber Co., Morgantown, W. Va., has started production on tubes and expects to reach capacity within a short time.

Oldsmar Tractor Co., Oldsmar, Fla., has erected a \$50,000 addition to its plant.

OLIVER CHANGES OWNERSHIP

MILWAUKEE, Nov. 15—The Oliver Mfg. Co. of Chicago, one of the pioneer manufacturers of lifting jacks in this country, has been acquired by Milwaukee interests represented by Helmus B. Wells, for fourteen years secretary of the Northwestern Malleable Iron Co., Milwaukee. The Oliver Mfg. Co. of Milwaukee has

been incorporated in Wisconsin with \$75,000 capital to take over the business. The plant will be moved from Chicago to Milwaukee and enlarge its production to include wrenches, tools, etc. Wells takes the general management, although retaining an interest in the Northwestern foundry.

Union Steel Company
to Build "Vanderbilt"

CHICAGO, Nov. 14—The Union Steel Mfg. Co., manufacturers of tools and automobile parts and equipment, has purchased a plant in Brazil, Ind., with 60,000 feet of space on one floor and three acres of ground for expansion. It will move its entire equipment from Chicago during the next sixty days.

The company plans to manufacture an eight-cylinder in-line car to be known as the "Vanderbilt." The chassis price is to be \$4,000 and bodies will be offered ranging in price from \$2,500 to \$7,500.

A. J. L. Dueth, general manager, has been identified with the American automobile industry for many years and has also had experience abroad. The company figures on employing 300 men. It is capitalized at \$250,000 and is an Illinois corporation. Ad. Judae of Bernard Judae & Co., is president.

New Gulfport Plant
to Open Next Month

GULFPORT, MISS., Nov. 12—The Richard Carter Automobile Company, which is to manufacture steam automobiles, trucks and tractors on the patents of Dr. Richard Carter of Hammond, La., will be in operation about Dec. 1, if work proceeds as rapidly during November as it has during the preceding two months. The company now has one all-daylight unit of its plant virtually completed, and the machinery for the plant is here, waiting installation. Dr. Carter is president and J. H. Rigg of Gulfport vice-president of the company, which is capitalized at \$1,000,000. The company bought 20 acres of land for the factory here, and began work as soon as the patents on automobile, stationary and marine steam engines were issued to Dr. Carter. The company also will manufacture a steam tractor, the body of which can be raised or lowered, for the cultivation of growing cane and corn and rice.

PACKARD BUILDS MORE TRUCKS

DETROIT, Nov. 15—Interesting facts in connection with Packard production are revealed in a financial statement issued by a brokerage firm yesterday. The statement shows the actual production of Packard cars in 1919 to have been 7040 while truck production amounted to 7305. Since the new Single Six went on the market in August, the report says, 316 had been produced up to and including Oct. 31. Production of 450 during November is anticipated. The company's export business in 1919 according to the statement amounted to 618 passenger cars and 541 trucks, valued at \$4,220,757.

Bank Credits

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

NEW YORK, Nov. 18—Sharp declines in commodity prices last week and further evidences of slackening business activity were reflected in marked recessions in prices of securities, rails as well as industrials, a number of new low records for the year being made near the week end.

Call money rates were easier on Monday, the rate for renewals being 8½ per cent, after remaining at 9 per cent for three weeks. Time rates, however, hardened slightly last week, with the customary small volume of business. The offering of a new issue of Treasury certificates, dated Nov. 15, at 5½ per cent, the same rate as that paid on the previous issue, was a disappointment to those who had expected the rate would be lower and indicative of an early general easing of money rates.

The associated banks of the New York Clearing House succeeded last week in overcoming the previous week's deficit of \$1,306,790 in legal reserves, leaving a net excess of \$32,206,180. Loans were reduced \$47,937,000, and deposits \$27,841,000. For some weeks deposits had declined more rapidly than loans, indicative of the transfer of funds from this center.

The Federal Reserve Banks also showed an improved position. Gold holdings increased \$7,005,000 and total reserves were larger by \$10,282,000. Loans showed a decided contraction, total bills on hand declining \$53,990,000. Net deposits decreased \$20,159,000, and Federal Reserve note circulation was lower by \$25,195,000.

The ratio of gold reserves to Federal Reserve notes in circulation, after setting aside 35 per cent against net deposits, rose from 47 per cent to 47.9 per cent, the greatest single gain in the ratio in recent weeks.

WOULD RESTRAIN CAR SALES

BOSTON, Nov. 15—Referee in Bankruptcy Olmstead has been asked by Receiver George W. Reed of the Massachusetts Motors Co. to restrain certain creditors from disposing of 100 automobiles and \$62,000 in cash received from the sale of 70 other motor cars. Reed claimed the defendants seized the property before a petition in bankruptcy was filed, knowing the company was insolvent. The concerns named as defendants are the Federal Finance Corp., the Commercial Finance Corp., the Mutual Finance Corp., Guaranty Securities Corp., First Peoples Trust Co. and E. B. Lund Co.

EQUIPMENT SHIPPED ABROAD

KALAMAZOO, Nov. 15—Dearborn Garage Equipment Co. has shipped a carload of its special service station equipment to Buenos Ayres, also a like amount to Montevideo, Uruguay. In both cases the equipment goes to Ford dealers.

FINANCIAL NOTES

Hupp Motor Car Co., for the three months ending Sept. 30, reported net after taxes of \$843,535, or more than the company earned in any year prior to the fiscal year ending June 30, 1920, when \$2,668,299 was earned. Net for the quarter was equivalent to \$1.59 a share on the common after preferred dividends. Thus in this quarter the company earned its whole year's dividend by a 50 per cent margin. The balance sheet showed net quick assets of \$3,866,604, equivalent to \$5.80 a share on common after deducting preferred at par.

Denby Motor Truck Co. stockholders will meet Nov. 20 to act on the recommendation of the directors to increase the capital stock from \$500,000 to \$2,500,000. Under its plan \$2,000,000 of Class A common will be issued, for which present stockholders would be permitted to subscribe on a basis of eight shares of new stock for each share of stock now held. The directors expect to use the new money to pay off existing indebtedness and create a new working capital.

Simms Magneto Co. stockholders will vote on Nov. 30 on creating \$500,000 8 per cent. convertible debenture bonds, to be dated Jan. 1, 1921, convertible into common stock any time after two years at \$10 per share. They will also vote on increasing the authorized common stock from 100,000 shares (par \$5) to 200,000 shares, for the conversion of the bonds. The company has \$1,000,000 7 per cent cumulative preferred stock outstanding.

American Bosch Magneto Corp. directors will meet Nov. 19 and will order the regular quarterly distribution of \$2.50 a share. This distribution has been more than earned in the last quarter. For the full year the company should show earnings after taxes of \$15 a share. The final quarter will be the poorest, but allowing for this the final balance should reveal a 50 per cent margin of safety for the common dividend.

Pierce-Arrow Motor Car Co. on Aug. 1 showed its total current liabilities to be \$2,900,000 and current assets about \$18,400,000, leaving excess current assets of \$15,500,000, against its preferred stock issue of \$10,000,000. The company owes \$1,000,000 to banks, against which there is \$2,000,000 cash. Reserves for depreciation aggregate \$2,500,000. The company will not have to do any financing.

Belden Mfg. Co. stockholders rescinded action taken Aug. 10 increasing the company's capital from \$2,000,000 to \$4,000,000. Instead the capital will be increased \$1,000,000. The company makes electric wires and other appliances for the automobile industry.

Automotive Foundry Corp., established at LaCrosse, Wis., several months ago, has increased its authorized capitalization from \$100,000 to \$200,000 to finance the expansion of its business and the construction and equipment of works.

Chandler Motor Car Co. directors will meet this week to declare the regular quarterly dividend of \$2.50 a share. Officials anticipate a continuance of curtailed production until Spring. Sales are now better than shipments.

GENERAL MOTORS GETS FUNDS

NEW YORK, Nov. 15—Final payment will be made to the General Motors Corp. on Dec. 1 for the \$36,000,000 of stock which was purchased several months ago by English and Canadian interests. The corporation already has

received 10 per cent of the amount. The payment, which soon will be made, will strengthen materially the company's cash position. General Motors already has reduced its inventories substantially by the sale of finished products and manufacturing expense already has been curtailed so far as efficiency will permit.

Curtiss Shows Loss
in Balance for Year

NEW YORK, Nov. 15—The revised balance sheet of the Curtiss Aeroplane & Motor Co., as of June 30, last, discloses a profit and loss deficit of \$1,445,238. As compared with 1919 it shows:

Assets	1920	1919
Land., bldgs., equip., etc.	\$502,111	\$6,589,370
Gdw. and pat.	1,933,045	2,353,461
Investments	807,126	702,400
Inventories	3,244,040	610,540
U. S. Govt. planes	1,766,923	.....
Accts. and notes rec. (less res.)	785,165	2,740,744
U. S. bonds	253,450	.....
Cash	111,003	2,858,390
Dfd. chgs.	143,827	217,324

Totals.....\$9,646,690 \$16,072,229

Liabilities	1920	1919
Pfd. stock	\$5,275,300	\$6,000,000
Com. stock	1,090,300	1,090,300
U. S. Govt. mat. and mch.	983,687	.....
U. S. Govt. plane. acct.	1,190,000	4,000,000
Res. for pfd. stk. red.	600,000	300,000
Accts. pay., payrolls	515,715	557,056
accrd., etc.	222,410	.....
Due Curtiss Eng. corp.	545,772	.....
Notes pay.	225,000	1,353,853
Advances	143,244	.....
Cust. init. pay.	.....	500,000
Fed. taxes	.....	2,271,020
Profit and loss surplus	1,145,238	.....

Totals.....\$9,646,690 \$16,072,229

DEPOSIT TIME EXTENDED

NEW YORK, Nov. 16—The Maxwell-Chalmers management committee met today and extended until Nov. 27 the time for depositing claims against the companies under the reorganization plan. It is understood to be a certainty that the plan will be declared operative in the near future. The Maxwell and Chalmers companies have greatly strengthened their position in the past few weeks by the closing of the plants and the sale of a large number of completed vehicles.

SHE-BOY RUBBER ORGANIZED

SHEBOYGAN, WIS., Nov. 15—The She-Boy Rubber Co. has been organized by Milwaukee and Sheboygan, Wis., capital to manufacture tires, retreads and rubber goods generally. It is capitalized at \$675,000. A plant is being rebuilt and enlarged at Sheboygan, to be ready March 1. The president of the new concern is Leo Hofmeister of Milwaukee, head of the North Star Oil & Rubber Corp. and other rubber companies. The executive offices of the She-Boy company will be at 176-182 Sixteenth Street, Milwaukee. Besides Mr. Hofmeister, the officers are: Secretary and office manager, E. A. Hickey, Sheboygan; treasurer, C. M. Halderson, Valders, Wis.; vice-president, Dr. Daniel F. Knauth, Kiel, Wis.

MEN OF THE INDUSTRY

Will C. Heath, general superintendent of the main works of Fairbanks, Morse & Co. at Beloit, Wis., has been promoted to general manager, succeeding W. S. Hovey, who has been elected a vice-president, in charge of all plants and production, with headquarters in Chicago. Heath became general superintendent a year ago, when W. E. Seymour resigned to join the A. O. Smith Corp., Milwaukee, as vice-president and general manager. Heath is a graduate of Lewis Institute and the college of engineering, University of Wisconsin.

Paul Fitzpatrick, vice-president of the General Motors Acceptance Corp., sailed Nov. 10 on the "Cretic" for Genoa. As one of the leading experts in automobile financing in this country, Fitzpatrick will make a study of the possibilities offered by Europe for financial assistance, and at the same time will aid American industry in enlarging the export market for its products. He will visit Italy, France, Spain, Belgium, Holland and England.

L. C. Wilson, for the past two years general sales manager of the Chain Belt Co., Milwaukee, has been elected secretary of the Federal Malleable Co., West Allis, Wis., manufacturers of malleable castings, malleable chain and the rapid molding machine. He will be succeeded as sales manager at the Chain Belt Co. by Clifford F. Messinger.

Albert A. Dowd, founder and formerly president of the Service Eng. Co., New York, has severed his connections with that company and formed another company to be operated under the name of the Albert A. Dowd Eng. Co., with offices and drafting rooms at 131 West 39th Street, New York.

R. T. Wallace, of the Cleveland branch of the Keystone Oil & Mfg. Co. of Chicago, has been promoted to manager of the fuel and gas oil department. Omar Baldwin, of the Chicago office, will take his place in Cleveland. T. F. Thompson has been appointed manager of the light oil division.

Charles F. Van Sicklen has become associated with the Briggs & Stratton Co. of Milwaukee as vice-president in charge of sales. The Briggs & Stratton Co. is one of the largest makers in the world of electric switch panels, ignition switches and locks.

Keene B. Phillips has purchased an interest in the Automotive Sheet Metal Co. and has been named secretary and member of the board of directors. He will have charge of sales, enabling C. B. McDole to devote his efforts exclusively to production.

W. S. Oakes has returned to Kalamazoo and resumed his position as general superintendent of the Barley Motor Car Co. Oakes was granted a long leave of absence to recover from illness.

Col. Frank E. Smith has been elected a director and first vice-president of the Republic Motor Truck Co. to succeed W. J. Baxter, resigned.

A. R. Johnson has been appointed assistant sales and advertising manager of the Auburn Automobile Co., Auburn, Ind.

G. RAY HALL DIES

BATH, N. Y., Nov. 12—G. Ray Hall, one of the organizers of the Curtiss Aeroplane Co., died here, Nov. 1. He retired from business at the outbreak of the war, when the plant was taken over by the government. He leaves a widow and son.

Calendar

SHOWS

- Dec. 10-18—New York. Motor Boat Show. Grand Central Palace.
- Jan. 3-8—New York. Motor Truck Show, Motor Truck Ass'n of America, Twelfth Regiment Armory.
- Jan. 8-15—New York. National Passenger Car Show, Grand Central Palace. Auspices of N.A.C.C.
- Jan. 17-22—Milwaukee. Annual Automobile Show, Milwaukee Automotive Dealers' Ass'n.
- Jan. 22-27—San Francisco. Second Annual Pacific Coast Automotive Equipment Exposition, Auditorium.
- Jan. 22-29—Cleveland. Annual Passenger Car Show, Cleveland Mfrs & Dealers' Ass'n, Wigmore Coliseum.
- Jan. 22-29—Montreal. Annual Automobile Show, Montreal Automobile Trade Ass'n, Motordrome Bldg.
- Jan. 29-Feb. 4—Chicago. National Passenger Car Show, Coliseum, Auspices of N.A.C.C.
- Feb. 5-12—Minneapolis. Annual Automobile Show, Minneapolis Automotive Trade Ass'n.
- Feb. 6-12—Columbus. National Tractor Show, Columbus Tractor & Implement Club, Ohio State Fair Grounds.
- Feb. 12-19—Hartford, Conn.. Annual Automobile Show, Hartford Automobile Dealers Ass'n, Armory, Arthur Fifeot, Mgr.
- Feb. 13-19—Kansas City. Annual Automobile Show, Kansas City Motor Car Dealers' Ass'n.
- Feb. 14-19—Winnipeg. Western Canada Automotive Equipment Show.
- Feb. 19-26—San Francisco. Fifth Annual Pacific Automobile Show, Exposition Auditorium, George Mahlgreen, Mgr.
- Feb. 21-26—Louisville. Annual Automobile Show, Louisville Automobile Dealers Ass'n, First Regiment Armory, C. L. Alderson, sec'y.
- Mar. 2-11—Des Moines. Annual Automobile Show, Coliseum, C. G. Van Vliet, Mgr.
- Mar. 5-12—Brooklyn. Annual Automobile Show, Brooklyn Motor Vehicle Dealers Ass'n, 23d Regiment Armory, George C. Lewis, chairman.
- Mar. 7-12—Syracuse, N. Y.. Annual Automobile Show, Syracuse Automobile Dealers Ass'n, Armory, Howard H. Smith, Mgr.
- Mar. 7-12—Indianapolis. Annual Automobile Show, Indiana-

polis Automotive Trade Ass'n, Automobile Bldg., State Fair Grounds, John Orman, Mgr.

Mar. 12-19—Boston. Annual Automobile Show, Mechanics Bldg. and South Armory.

Mar. 14-19—Omaha. Annual Automobile Show, Omaha Automobile Trade Ass'n, Inc., Omaha Auditorium, C. G. Powell, Mgr.

April—Chattanooga, Tenn.. Spring Automobile Show, Chattanooga Automotive Trade Ass'n, Sunday Tabernacle, C. A. Noone, sec'y.

Dec. 7-10—Cincinnati. Automobile Show in connection with Ohio Automotive Trade Ass'n Convention, auspices of Cincinnati Automotive Trade Ass'n, Music Hall, J. J. Behle, Mgr.

FOREIGN SHOWS

Nov. 29-Dec. 4—London. Cycle and Motorcycle Show, Cycle and Motorcycle Mfrs. and Traders Union, Ltd., Olympia.

Jan. 7—Sydney. Australian Motor Show.

Jan. 22-29—Colombo. Ceylon Motor Show.

Feb. 7—Delhi, India. Delhi Motor Show.

CONVENTIONS

Nov. 30-Dec. 2—St. Louis. Third Annual Meeting and Exhibition, Automobile Accessories Branch, National Hardware Ass'n.

Dec. 7-10—New York. Annual meeting American Society of Mechanical Engineers, Engineering Societies Building.

Dec. 8-9—Cincinnati. Annual Convention, Ohio Automobile Jobbers' Association

Dec. 12—Washington. Convention of American Association of State Highway Officials.

Dec. 28-30—Chicago. Annual Meeting American Society of Agricultural Engineers.

Jan. 7—New York. Advertising Managers Council, Motor & Accessory Manufacturers' Ass'n.

Jan. 11-18—S. A. E. Annual Meeting, New York City.

Feb. 2-4—Chicago. First Annual Meeting, Automotive Electric Service Ass'n. Hotel La Salle.

Oct. 12-14, 1921—Chicago. Twenty-Eighth Annual Convention National Implement & Vehicle Ass'n.

RACES AND TOURS

Nov. 25—Los Angeles. Thanksgiving Day Speedway Classic, Beverly Hills Speedway.

S. A. E. Midwest Section Discusses Castor Oil

CHICAGO, Nov. 13—Mineral Oil Versus Castor Oil for the Lubrication of Internal Combustion Engines was the title of a paper presented by William F. Parish before the Midwest Section of the S. A. E. on Nov. 12. This paper dealt particularly with the use of castor oil as a lubricant for aircraft engines. It showed that castor oil may be very serviceable for certain classes of work when used for short periods of time, but in continuous use the oil develops characteristics that make it quite unsuitable and inferior in comparison with the proper mineral lubricating oil.

This is the first paper that has been presented to the S. A. E. on this topic and is based on test data taken from the official Government test records compiled by the Lubrication Department of the Air Service during the war. Parish was actively engaged in the development of the lubrication policy that was adopted by the Air Service, and also in the development of oil specifications for all branches of the service.

A short discussion which did not deal directly with Parish's paper was led by R. W. Smith of the Sinclair-Refining Co. This contained a report on a chemical analysis of the substance found in a motorcycle racing machine after a test with castor oil. The substance found, which caused clogging of the oil feed pipes, was very similar to rubber. Analysis revealed the fact that it was oxidized oil.

J. W. Stack of the Standard Oil Co.

discussed an analysis of a substance very similar to that which was found in the motorcycle engine, which he had obtained from an automobile engine using castor oil for lubrication.

Balanced Valve Motor to Locate in Wausau

WAUSAU, WIS., Nov. 12—The Balanced Valve Motor Co., a \$300,000 corporation which has been conducting an experimental shop in Milwaukee for the past year, will locate its permanent works and general offices in Wausau, Wis. The Wausau common council has provided a four-acre site. Local capital will invest from \$100,000 to \$125,000.

The company will manufacture passenger car, truck and tractor engines and a small, compact, 1-cylinder unit for electro-generators, pumps, etc. The small type will be placed in production first. The design is protected by basic patents and involves a new principle of valve mechanism, eliminating about 130 parts used in the ordinary 4-cylinder engine.

Officers of the corporation are: President and chief engineer, William M. Baumheckel, Milwaukee; vice-president, G. B. Rusco, West Bend; secretary, G. E. Pieper, Milwaukee; treasurer, E. W. Eberhardt, Milwaukee.

BLERIOT PLANT CLOSED

NEW YORK, Nov. 16—A dispatch from Paris states that the Bleriot airplane works have been closed indefinitely, throwing 2000 persons out of work. Rioting by employees was suppressed.

"Mercantile Express" Now in Production

DETROIT, Nov. 12—The Commerce Motor Car Co. has added a model which will be known as the Mercantile Express, with a capacity of 1500 to 2500 lb. The chassis will sell for \$1,350 and it will be provided in three types of bodies on a 127-in. wheelbase chassis. The bodies provided are the open express at \$1,550; flareboard express for \$1,450, and convertible stake type for \$1,505. In addition, an open cab top will be sold at \$85, or an all-weather pullman type cab for \$125.

The truck is assembled from standard units, including the Continental 3½ by 5-in., four-cylinder engine; Detroit Gear, truck type transmission; Zenith carbureter; Stewart vacuum system; Jacox steering gear; Spicer universal joints and Detroit Steel Product springs. It is equipped with Bijur electric lighting and starting and an Eisemann magneto. The truck is fitted with Goodyear pneumatic cord tires, all around. The truck, which will be known as model T, Mercantile Express, 1921 series, is now in production and is being shipped to dealers.

FARM MOTORIZER FORMED

RACINE, WIS., Nov. 15—A charter has been granted to the Farm Motorizer Co. of Racine, Wis., a new corporation with a capital of \$250,000, organized by James E. Shine, Leonard P. Baumbloft and H. O'Donnell to engage in the manufacture of power farm operating machinery, appliances, implements, etc.

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German Automotive Factories Prepare for Competition

In this second article on Germany, Mr. Bradley visualizes for the American Industry the competition it will have from that country in the world markets. He tells of the factory equipment, of the possible production, and to as great an extent as could be expected, the plans of the engineers.

By W. F. Bradley

THERE are two Daimler automobile factories in Germany. The one at Marienfeld, near Berlin, produces trucks only, while the better-known concern is the Daimler Motoren Gesellschaft, producing Mercedes passenger cars and a light truck at Unterturkheim, near Stuttgart. Daimler-Marienfeld was running 1500 hands at the end of September, on an 8-hour basis, but was only working three days a week: Wednesday, Thursday and Friday. It was stated that it was intended to lay off 500 men and increase to 5½ days a week. It was uneconomical, particularly in the forges and heat treating departments, to work only 24 hours a week, but the German law did not permit laying off men until the working hours had fallen below 28 per week.

At least half of the Daimler-Marienfeld works have been built during the war. The factory buildings are excellent and the works well laid out, but the equipment is not designed for the most economical production. During the war the company built exceedingly fine rest and recreation quarters within the factory grounds, the building comprising large dining halls,

kitchens, ice making plant, and bedrooms and quarters for the technical staff. The management seemed to regret having devoted the money to this purpose, for the effort was not appreciated by the men, and it was declared that the capital could have been used to better advantage at the present time.

The automatic telephone system established throughout the factory building is particularly good, being much superior to anything usually found in Europe. Electric current for power is secured from an outside company, but heavy oil engines are kept in reserve for emergencies, and storage batteries provide reserve current for lighting at night, etc.

During the war Daimler-Marienfeld was kept principally on truck production for the German army, the output being 60 to 100 per month, with a staff of 2500 men. In addition Diesel engines were built for submarines and some tanks were produced under designs furnished by the war department. The factory engineers considered that this was one of the reasons for the failure of the German tanks, for the army designs were decidedly faulty.

The factory is interested only in trucks, of which two types are produced: a 3-tonner with bevel gear drive and a 5-tonner with internal gear drive. The home business was practically dead owing to the high cost of production, for the smaller truck could not be offered at less than 100,000 marks without tires. In consequence, Daimler was working on export, particularly with Scandinavia and South America.

Daimler Truck Design

These two types of trucks were produced during the war for the German Army and in being continued for peace purpose the only change of importance is the fitting of solid rubber tires in place of steel or coil spring tires. The bevel gear type truck had to be abandoned during the war, and replaced by chain drive, for it was found that without rubber tires the bevel gear axle would not stand up. The internal gear drive truck proved quite satisfactory on steel tires, but owing to the absence of tires it was necessary to cut down speed. Trucks which normally ran at 10 miles an hour were rigorously held to a maximum speed of $7\frac{1}{2}$ m.p.h. It was only on this condition that a service could be maintained. Vibration was excessive on the steel tired trucks and necessitated the use of castellated nuts and cotter pins on every bolt throughout the vehicle. During the war the use of copper and brass for truck construction became impossible, and even on the peace models steel piping is used extensively in place of copper, for gasoline, oil and water lines.

The Daimler construction is characterized by thoroughness and attention to detail, but the design is somewhat complicated. The engines have overhead valves operated by a camshaft in the base chamber and push-rods. The timing gear is in the center. During the war it was necessary to run trucks on the most diversified fuels; gasoline, kerosene, methylated spirits, benzol and lignite tar oil. Each truck had a small quantity of gasoline allowed for starting, this being carried in a reserve tank on the dash, and although some of the lowest grade fuels have been abandoned, the tank is still retained. Cast steel wheels are used exclusively.

Some attention is being paid to the agricultural tractor. A big, heavy machine built before the war has been replaced by a lighter model, but even this appears to be much too heavy and costly to operate under conditions prevailing in Germany.

Labor Trouble at Mercedes Plant

At the end of September the Mercedes automobile factory at Unterturkheim, near Stuttgart, was in possession of the military and had been closed for one month. The dispute arose over the refusal of the men to pay the 10 per cent State tax on their wages. This dispute had affected the whole of the factories in the district, but in other shops the men had returned to work after having decided to obey the law. The impression was obtained that the Mercedes dispute was being continued in order to enable the management to get rid of some of the more radical reformists, who, by reason of the law, could not be dismissed in the ordinary way.

Mercedes is the biggest of the German factories, its present staff being 8000, compared with 4000 before the war and 18,000 during hostilities. The present program provides for the production of two types of passenger cars, a 16 hp. four cylinder with 3.9 by 5.1 in. Knight engine and a 22 hp. four cylinder valve in head 4 by 5.5 in. engine. The chassis with Knight engine is sold at 145,000 marks without tires, and the price of the six-cylinder chassis, without tires, is 195,000 marks, but no guarantee is given that these prices will be maintained.

Mercedes is also producing a fast 2-ton truck with L-head engine, designed to be used either with solid or pneumatic tires. These three models are all pre-war design.

It was impossible to visit the Mercedes factory, even the management being confined to small offices in Stuttgart and unable to get into their own works. Mercedes filled an important role during the war, for the whole of the big factory at Unterturkheim was employed in turning out aviation engines. These engines had been thoroughly developed both in the air and on the road during the three or four years preceding the war, and not only were they used throughout the hostilities with only detail changes in design, but they served as a model for many of the Allied engines. It was stated that the body shops were producing household furniture.

Benz Plant Busy

The impression of greatest activity in the German automobile industry was obtained at the Benz factory at Mannheim. There are three distinct establishments: a passenger car factory, a truck and tractor factory and works for Diesel and marine engines. The three establishments employ 8500 workmen and an office staff of 1800. During the war the greatest number of men employed was 16,000. Benz then devoted his attention to airplane engines, building his own type of six-cylinder vertical, and was also one of the biggest producers of submarine engines in Germany. Because of the special knowledge the factory possessed of airplane and submarine requirements, it produced very few passenger cars and trucks, but allowed smaller firms to build these to their design.

Benz was found to be in active production on passenger cars, which were being turned out complete with bodies built in the company's own works. Five distinct types are listed, but of these only the first two, given in the following list, appear to be in production to any important degree, while the six-cylinder was not seen at all:

Passenger cars—

4 cyl.	8-20 hp.	74.5 x 120 mm.	(2.93 x 4.73 in.)
4 cyl.	14-30 hp.	90 x 140 mm.	(3.54 x 5.51 in.)
4 cyl.	18-45 hp.	100 x 150 mm.	(3.94 x 5.90 in.)
4 cyl.	25-35 hp.	120 x 144 mm.	(4.73 x 5.68 in.)
6 cyl.	27-70 hp.	100 x 150 mm.	(3.94 x 5.90 in.)

In the horsepower rating given above the first figure represents the power from the taxation standpoint and the second figure the actual power developed.

In the truck factory three types are being built, of 3, 4 and 5-ton capacity. It is intended to get out very shortly a light type of agricultural tractor, generally on Ford lines, weighing about 4500 lb. A heavier agricultural tractor, weighing 4 tons, will also be produced.

The attitude of Benz with regard to aviation appears to be similar to that of other German firms having figured prominently in engine construction during the war. It is recognized that there is no immediate future, but development of commercial aviation is certain to come and on that account the factory should keep in touch by means of experimental work. The excessively high powered engines developed toward the end of the war are not considered suitable for commercial services and greatest attention will be paid to economical commercial types of about 200 hp.

Labor Conditions

In common with the whole of the German industry, the Benz shops are working eight hours a day; unlike some of the others, the factory is working a full six days a week. Work begins at 7 in the morning and finishes at

3 in the afternoon, there being a break of half an hour in the middle of the day for a light meal, which is eaten in the shops.

It is admitted that the efficiency of the workers is not very high. To avoid unemployment, there are restrictions covering the laying off of hands, and this has a tendency toward reduced effort. While men are earning seven to eight marks an hour, the high cost of all necessities makes them no better off than when they were only earning 70 pfennings before the war. The food situation in Germany is still very unsatisfactory, and in the manufacturing districts there is undoubtedly a considerable amount of mal-nutrition.

The excessively high prices of automobiles in Germany is attributed by Benz to the high cost of raw and partly finished material, caused in a large measure by the unfavorable rate of exchange. Some of the small parts entering in the construction of cars have increased in cost 3000 per cent. There is still a shortage of leather, copper, brass, tungsten and sheet steel.

The coal situation is uncertain. Benz reported that their works had never been closed an hour for lack of coal, while other factories had been working only two or three days a week because of the lack of fuel.

Benz gets 15,000 horsepower from water power in the Black Forest, but in addition they have crude oil engines capable of running the factory in case of a failure of the main supply. Contracts have been placed abroad for big supplies of crude oil. Replies received from manufacturers regarding the coal supply were varied. While some admitted that they would not be affected, others stated that they would have to close during the coming winter, and others again believed they could only keep going with difficulty. The stocks laid in comprised hard coal, crude oil and lignite.

In Mannheim it was noted that very serious restrictions in street lighting had been put into effect with a view to economizing coal.

The Benz passenger car factory consists of one-story buildings, with the exception of the engineering and executive offices. They have been considerably extended during the war, and plenty of space is available for further additions. The models produced have undergone very few changes since the war, for general conditions have made it impossible to produce new designs. Benz, however, is working on new types, for both the home and foreign markets, and undoubtedly will be one of the most active of the German firms in the international field. No information is available regarding the new types. The Benz policy is to produce everything in its own shops with the exception of ball bearings, magnetos and tires. A high grade article is the objective and there is no intention of going into the cheap car field.

Opel a Private Concern

The Opel factory practically monopolizes the village of Russelsheim-on-the-Main. Employing 3000 men, compared with 7000 during the war and 5000 before 1914, the present factory is an entirely new structure composed of 5-story buildings, while the original factory is being used for repair work. The Opel firm is owned by members of the Opel family, and the amount of

capital and earnings of the concern are not made public.

At present Opel is producing two passenger cars, an 8-25 hp. and a 14-38 hp., a 4-ton truck, bicycles and a motorcycle. Although claiming to be in regular production on 200 complete cars per month, and the same number of trucks, the impression was gained that the works, which are very complete and allow of practically everything being built under one roof, were running far below their maximum production. Various jobs were noted which were not concerned with automobiles, and while some of the equipment was entirely up to date, other departments were old fashioned and some of the machinery was being run most economically, as if merely to give employment to the hands. The body works are extensive, but hand methods only are employed, and wood construction is used practically throughout. The bicycle department is small, and the motorcycle section, which has just got into production, is working on what must be described as a motor-assisted bicycle. The power plant is a small single cylinder engine attached to the frame and driving the wheel by means of a chain.

During the war Opel was engaged on trucks and staff cars and later on on aviation engines built to the design of a Munich firm. In order to test cars when roads were closed to ordinary traffic, the Opel company built a mile concrete track a short distance from the works. This is almost circular and is banked for speeds of about 65 miles an hour. At present it is used for testing all cars produced in the Opel factory.

The big 5-story stone and concrete factory of the N. A. G. (National Automobile Company), in one of the suburbs of Berlin, is particularly Teutonic. Viewed from the outside it has the appearance of a fortress, and this impression is enhanced by the entire absence of noise, smoke or steam. The whole of the present structure was erected during the war, and as far as buildings alone are concerned compares very favorably with the best to be found in America or elsewhere. Use is made here—although this is not an exclusive N. A. G. feature—of continuous chain elevators, carrying two persons, and, of course, requiring no attendant.

Engine and Chassis Tests

N. A. G. is one of a combine including the Hansa-Lloyd and the Brennabor companies. Under this arrangement it is specializing on a 3-ton truck and on a passenger car with a four cylinder 3.27 x 4.65 in. engine. Some work is also being done on electric trucks for city service. The factory is running a staff of 1400 men and building largely for export in view of the depressed condition of the German market. Very few changes have been made in design since 1914, either for the trucks or for the passenger cars. Modifications, however, are going through, and among these are cantilever springs and spiral bevel gears. For these latter comparative tests are being made with Gleason gears and a German type of spiral bevel.

All the car bodies are built in the company's own shops and are all wood construction. The disappearing top is used on all of them, and the claim is made that patents are held for this feature. The factory has a very good chemical laboratory and experimental department, and is well fitted for engine testing. All engines are run in on coal gas and tested for power on gasoline; the

IN this article Mr. Bradley makes it plain that German automotive engineering has advanced only slightly since the armistice. His interpretation of the plans of the industry in that country makes especially valuable a study of the recent articles in *Automotive Industries* describing the German war trucks and the recent description of the Mercedes-Knight car. These descriptions tell of the competition you will meet in export trade.

chassis are run on rollers and finally tested on the road.

Although not laid out for quantity production, as it is understood in America, the N. A. G. shop equipment is good. All machines are driven by electric motors, and instead of these being placed on the floor, they are mounted on a uniform type of standard with reduction by means of silent chain to the pulley shaft.

Bosch Working Under High Pressure

Bosch, the world-famed magneto concern, at Stuttgart, was found to be working at high pressure with a staff of 8000 men, compared with 6000 before the war and 10,000 during hostilities. In view of the depressed condition and the generally small production of the German automobile industry, it was rather difficult to understand where the output was being disposed of. Switzerland, of course, is open, but it is a small field; the import duty makes it rather difficult to do business in England; in France there is a distinct stand, on patriotic and sentimental grounds, against magnetos of German manufacture; in America the possibilities are not very great, and Italy is not yet buying great quantities of magnetos outside her own territory. This exhausts the automobile producing countries, and yet Bosch appeared to be in extensive production and was employing more hands than before the war.

One explanation of this is that since 1914 starting and lighting sets have been added, and as the amount of work in one of these is very much greater than in a magneto, the number of hands could have increased while the number of magnetos produced could be less than before the war.

While there are other magneto manufacturers in Germany, notably Mea and Eisemann, the Bosch company may be estimated to have 75 per cent of the domestic business. Every passenger car built seems to be fitted with the Bosch lighting and starting set. Two distinct factories are being operated: the original establishment, which is working exclusively on magnetos of various types, and a new factory producing the lighting and starting set and spark plugs. This second establishment was originally a piano factory and was taken over and converted during the war. The Bosch factory, of course, is elaborately specialized and comprises much machinery designed specially for the firm's own particular class of work. Women and girls are employed to a certain extent, in distinction to the automobile factories, from which all female labor has been removed. The special repetition work also makes it possible to apply the piece work system to an important extent. There is

no indication of the adoption of ignition by generator and battery, for all Germany appears to be wedded to the magneto.

Unlike the Allies who found the magneto shortage a really serious problem during the war, Germany was very well supplied, for the Bosch factory alone was more than sufficient to meet the requirements of the German army motor and aviation services. On this account part of the Bosch works were made use of for producing shell fuses, and portable electric lighting sets, wireless telegraphy sets and other special electrical equipment was made for the war department. The house lighting sets, which are on the same general lines as those now produced in America, will not be continued, as there is no available home market.

Bosch was affected recently by the strike of the workers against the 10 per cent tax on wages, but the men gave in, whereas the workers at the neighboring Mercedes factory remained out. An 8-hour day is in force, the men working straight through with the exception of a half hour break at midday for a light meal which is eaten in the shops.

Conclusions

The technical condition of the German automobile factories is good. The factory buildings are all excellent; they are modern, well laid out, healthy, and provide excellent conditions for the workers.

The value of the equipment varies not only with the factories, but with the different departments of the factories. Some of the most modern equipment is found side by side with old-fashioned machinery.

No German automobile factory is efficiently equipped for modern quantity production. There are no conveyor systems and there is a dearth of devices for economizing labor. It is obvious that even during the war, the German automobile factories did not learn the lessons of quantity production to the same degree as the Allied nations.

The general layout is good, but the mechanical equipment is open to improvement.

Germany is best fitted to enter into competition on a small quantity, high quality basis.

The industry is likely to get more and more into the hands of a small number of comparatively big firms, or group of firms of medium importance, these firms producing practically the whole of the automobile under their own roof.

The assembled car is practically unknown in Germany.

Safety of High Tension Magnetos in Explosive Atmospheres

TESTS have been made for the British Advisory Committee for Aeronautics with nine magnetos to ascertain whether they would fire an explosive mixture surrounding them under any operating conditions. The magnetos were operated up to very high speeds and quite a few of them broke down in the tests. The breakdown of the 4-cylinder machines was due partly to insulation failure and partly to excessive potential difference across the armature owing to the safety spark gap being too large to protect the windings. The Advisory Committee points out that it is very desirable that the dimensions of this gap should be standardized on all machines; the lengths of the gap in two machines are now very often in the ratio of two to one.

There appears to be a tendency to regard the waterproof casing as sufficient protection for the safety gap without the use of wire gauze around the points. With

the present type of magneto this practice is certainly not a safe one. Sparking in small metallic pockets containing gas (such as the primary make and break box) may be permissible, but large spaces, such as the interior of a magneto casing, should not be permitted to contain exposed safety gaps when explosive gas is likely to be present, the committee concludes.

SOME rather interesting work has been undertaken for the Motor Transport Corps by the Bureau of Standards in connection with their experiments on the deterioration of automobile parts in service. A number of bearings and gears have been accurately weighed on the Bureau's balances and have been placed in cars in service. After a certain length of time these parts will be returned to the Bureau and re-weighed, the difference in weight representing, of course, the loss in metal due to wear.

Nash Engine Is Adapted to Four-Cylinder Practice

New product closely follows the six-cylinder features with the latest combustion refinements. Lubrication of powerplant is through positively driven gear pump. Chassis of 112-in.-wheelbase is employed for the four models of cars on 1921 program. New constructional features described.

By Roy E. Berg*

THE new product of the Nash Motors Co. follows closely the features of the well-known Nash Six; a few differences are necessitated by the fact that the car is of a smaller pattern and powered with a four-cylinder engine of the overhead valve type. The chassis is standardized in that it has a wheelbase of 112 in. for all body types, which include a five-passenger touring, two-passenger roadster, five-passenger sedan and three-passenger coupe. In road trim the touring car weighs 2650 lb., which gives a comparative idea of the car size.

The four cylinders of the engine and the upper half of the crankcase are a single casting. Cylinder dimensions are $3\frac{1}{4}$ by 5 in., which gives a piston displacement of 165.9 cu. in. The overhead valves are assembled with the detachable piston head and are actuated through push rods and rocker arms. Three point suspension is employed, one point at the front and one on either side of the engine at the rear. A pressed steel oil sump completes the lower formation of the engine and another pressed steel cover is fitted over the valve mechanism.

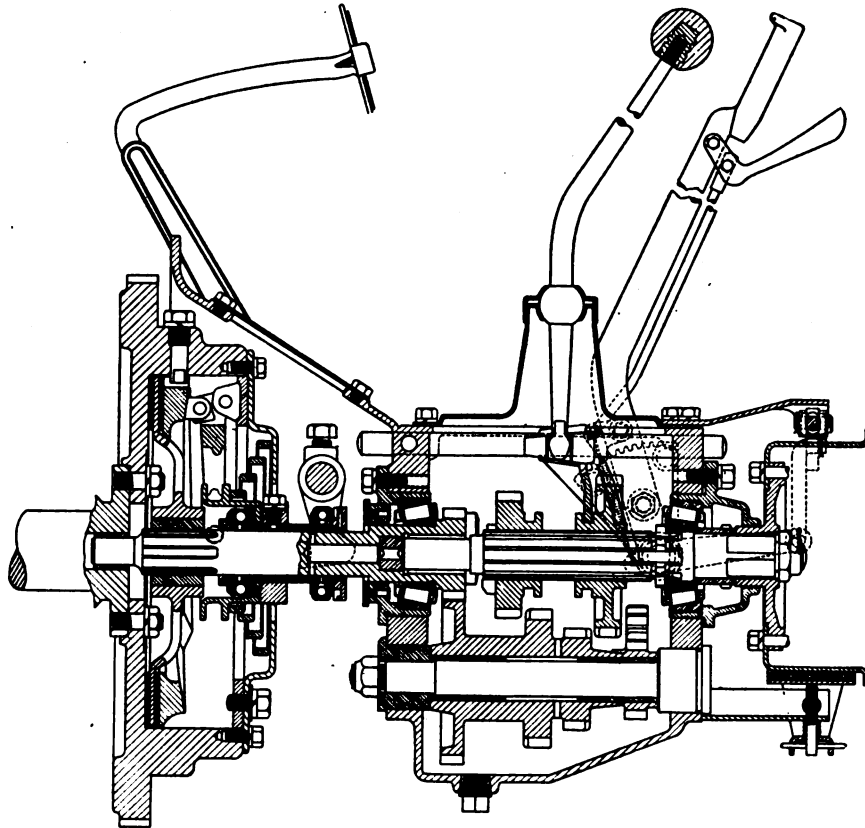
The pistons are of grey iron; they measure $3\frac{1}{2}$ in. in length and are fitted with three step cut piston rings of $\frac{3}{16}$ in. width, all being placed above the piston pin. The skirt of the piston is grooved and drilled to relieve any possibility of oil pumping. The after boss of the piston pin is drilled and tapped to accommodate a taper locking pin. The piston pins are of tubing, hardened and ground, and measure $\frac{15}{16}$ in. in diameter. The upper end of the

rod is bronze bushed and has a bearing length of $1\frac{1}{2}$ in. on the pin.

The connecting rod is of the "H" section type and measures 11.5 in. in length, which gives a rod length to crank-throw ratio of 2.3. Another reference to this ratio will be made further on. The lower end of the connecting rod might be termed conventional. The lower cap is held on

with two bolts fitted with castle nuts. Laminated shims are interposed at the bearing cap junction. The white metal is cast directly into the big end, which construction assists materially in heat dissipation.

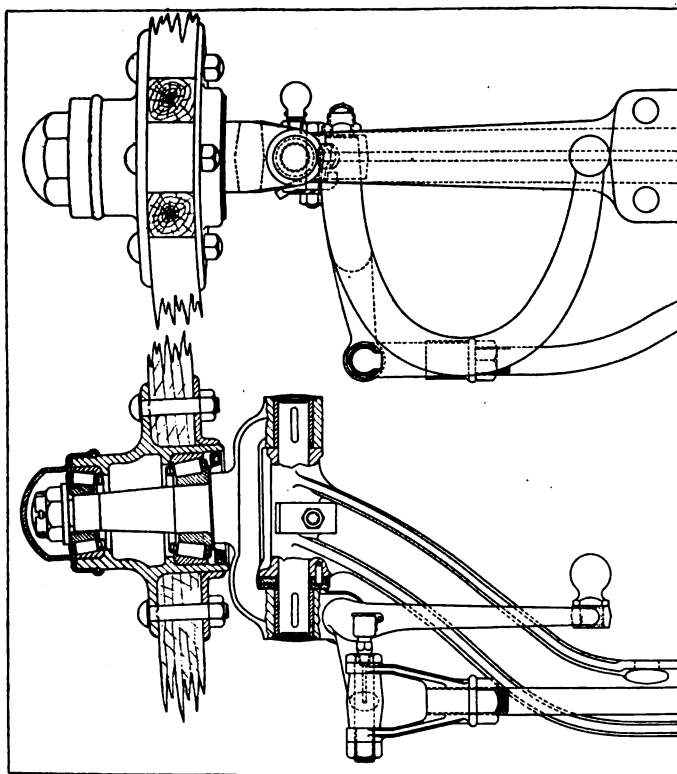
One of the most unusual features of construction found in this engine is the crankshaft, which is of the two bearing type. As a result of the use of this crank construction the overall length of the engine is only $17\frac{5}{8}$ in. Cooling space between the cylinders has not been sacrificed because of this construction, for each cylinder is completely surrounded with water. The cooling jacket is also



Section through clutch and transmission

very long, extending almost down to the crankcase and up to within $\frac{1}{4}$ in. of the top of the block. The front crankshaft bearing measures $2\frac{1}{4}$ in. in diameter by $2\frac{3}{4}$ in. in length and the rear bearing $2\frac{1}{4}$ by $3\frac{5}{16}$ in. For an engine of this size these bearing diameters are very large. However, the rigidity and freedom from vibration of this shaft are not due solely to the large diameter, for a very unusual counterbalancing system is employed. Three counterweights are fitted, these being separate steel forgings, forged and shrunk in place over dove-tail anchor heads. This is a very reliable method of securing the counterweights, and the Nash engineers state that the re-

*Technical Editor Motor Age.

*Axle and steering knuckle design*

sults are practically equal to an integral forging. After the shaft is fitted with the counterweights it is balanced on Norton and Akimoff balancing machines for dynamic balance, a perfect static balance having been secured previously.

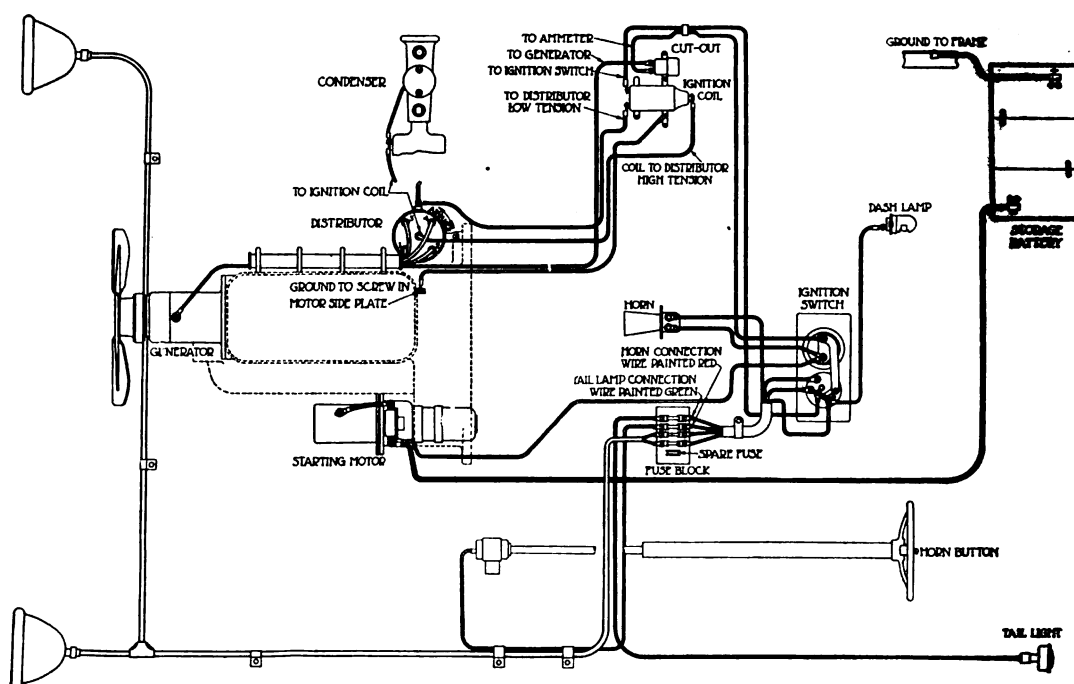
The camshaft is driven by helical gears and is of very large diameter. Like the crankshaft, the camshaft is also carried in two bearings, and these measure $1\frac{1}{8} \times 2\frac{5}{8}$ in. (front) and $2\frac{1}{8} \times 2\frac{3}{4}$ in. (rear). The rear bearing of the camshaft serves a dual purpose, for at its center a helical gear is cut which drives the oil pump and ignition head through a shaft which is inclined at an angle of about 17 deg. The valve rods are actuated through mushroom followers and pass through removable guides. A tappet bracket is secured to the block by means of four accessibly located cap screws. By removing these four screws the eight tappets may be lifted out as a unit. The rocker arms have a rocking contact on the valve stems and a ball contact on the push rods. The fulcrum of the rocker arms is a hardened shaft extending over the length of the engine. On this the rocker arms are threaded. Light end bearing springs are placed against the arms to eliminate rattle. Because of the peculiar contour of the cams, as much as 0.010 in. tappet clearance may be used

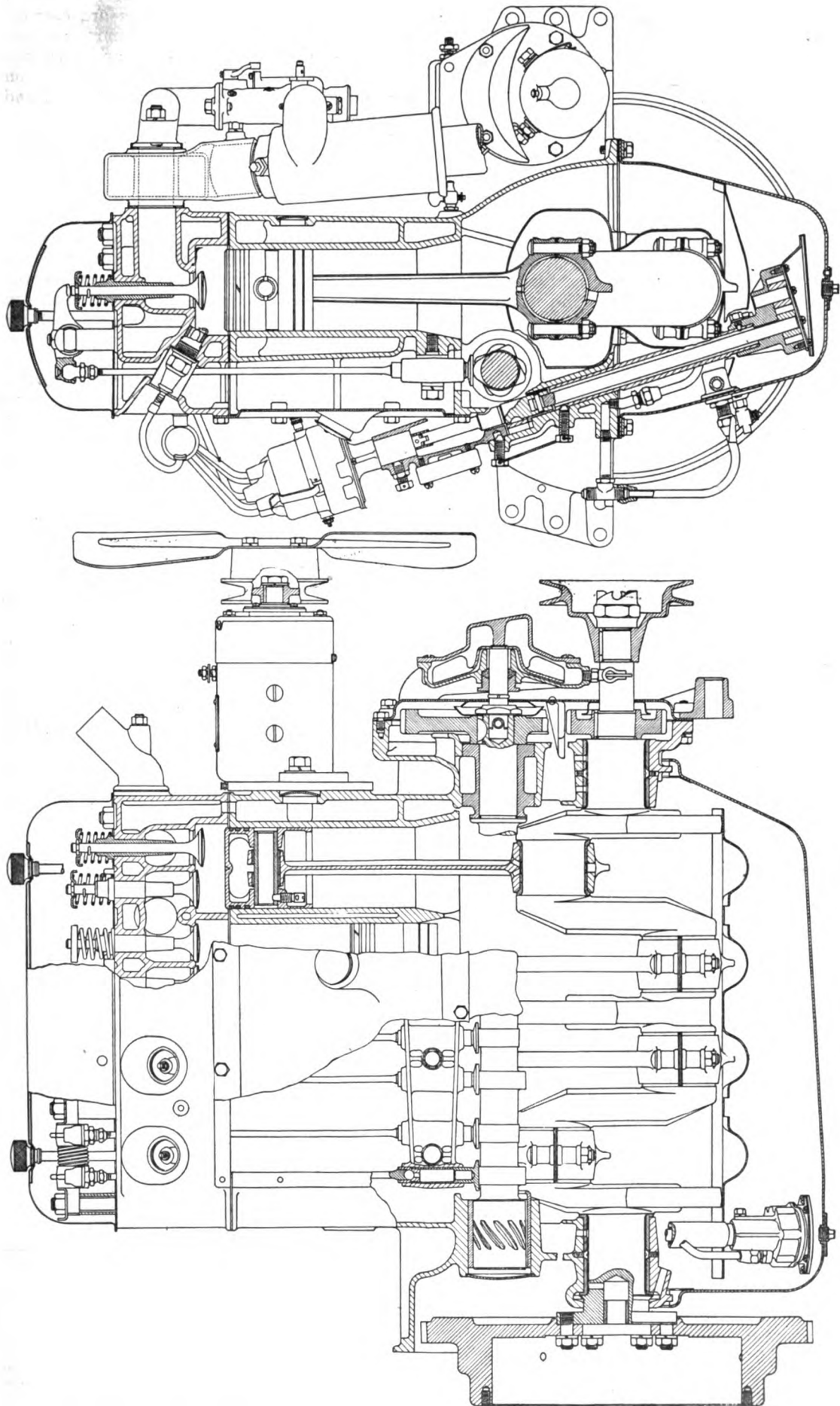
without creating undue valve noise. The valves are of conventional type, having a clear diameter of $1\frac{13}{32}$ in., a lift of $\frac{23}{64}$ in. and $\frac{3}{8}$ in. stems. The intake valve is of nickel steel and the exhaust of tungsten steel.

Some of the very latest refinements in combustion engineering are embodied in the manifolding and combustion chamber. A 1 in. Schebler plain tube carbureter is fitted. After leaving the carbureter the gases pass through the external intake manifold, which is secured against the exhaust manifold by through studs. At the ends of the "T" head section of the intake the gases enter round horizontal passages, one for cylinders Nos. 1 and 2 and the other for cylinders Nos. 3 and 4. These latter passages are integral with the exhaust manifold, and constitute a very effective hot spot arrangement. The walls of the cored passages through the exhaust manifold are very thin and require only a few engine revolutions to become heated. The surface distribution of the heavy fuel is therefore caused to pass over these hot walls where they become equally distributed to a Siamese pocket for the two intake valves. Mention may be made of the fact that no pockets exist in the intake passage for the accumulation of liquid puddles. The combustion chamber is wholly within the removable head. All surfaces are machined, which insures absolute uniformity of compression in all cylinders.

Lubrication of the engine is through a positively driven gear pump. Pressure leads feed the oil to the main bearings, and the connecting rod bearings are oiled by splash from the scoops which dip into the trough. Oil is also conducted to the timing gear compartment and thrown on the gears. A level indicator is provided on the steel pan and a pressure gage on the dash.

Cooling is by a centrifugal pump and tubular radiator. The pump is located on the forward end of the camshaft, in a readily accessible position. The water capacity of the radiator and engine is 15 quarts. The radiator inlet and outlet, in addition to the usual hose connections, also have flanged connections secured with two cap screws, which makes it unnecessary to disturb the hose connections when dismantling the radiator or removing the engine head. The cooling fan is mounted on the generator shaft, where it is driven by a Vee type rubber belt at $1\frac{1}{2}$ times engine speed. This combination unit is very much similar to that employed on the Nash Six.

*Wiring diagram of Nash Four*

Nash Four-Cylinder $3\frac{1}{4}$ x 5 in. Passenger Car Engine

Note particularly the balanced two-bearing crankshaft, symmetrical connecting rods, two-bearing camshaft, overhead valves with cover, spark plugs in cylinder head, inclined drive of oil pump and ignition unit, combined generator and fan drive and pressed steel oil pan

A Borg & Beck clutch is used and clutch and transmission together complete the powerplant. The transmission is secured to the engine by a half bell housing on the rear end of the crankcase. The gearset affords three forward speeds and is identical with the corresponding unit of the Nash Six. Roller bearings are employed on the main shaft of the transmission. The lay shaft is stationary and the countershaft gears revolve on it, being fitted with a bronze bushing. The rear end of the main shaft of the transmission is fitted with speedometer drive, and immediately back of this is carried the emergency brake. The conventional type of universal joint is employed.

The rear axle is of the semi-floating type, having the center line of the pinion and ring gear centrally located with reference to the differential gears. The construction of the rear axle housing is rather unusual. The central member, which carries the drive and differential gears, has secured to it on each side a megaphone shaped pressed steel housing which at its outer ends is riveted to the wheel bearing housing. An adjustment is provided for the pinion gear as well as for the ring gear. The front axle is also Nash made and is of the reverse Elliot type.

The springs are flat, practically speaking. The torque is taken by the springs by the Hotchkiss method. The

front springs are slightly different from conventional practice, in that the front ends are carried outside the frame. This allows of greater movement of the springs without causing a frame bump, and the extra insweep of the frame allows a very short turning radius. The rear springs are 53 $\frac{3}{8}$ in. in length by 2 in. in width and the front springs are 37 $\frac{1}{8}$ by 2 in.

The frame is not fitted with a splash apron, the running-board being secured to the bottom flange direct. The measurements of the frame channel are 6 in. deep with 1 $\frac{1}{2}$ in. flanges, and the stock is $\frac{1}{8}$ in.

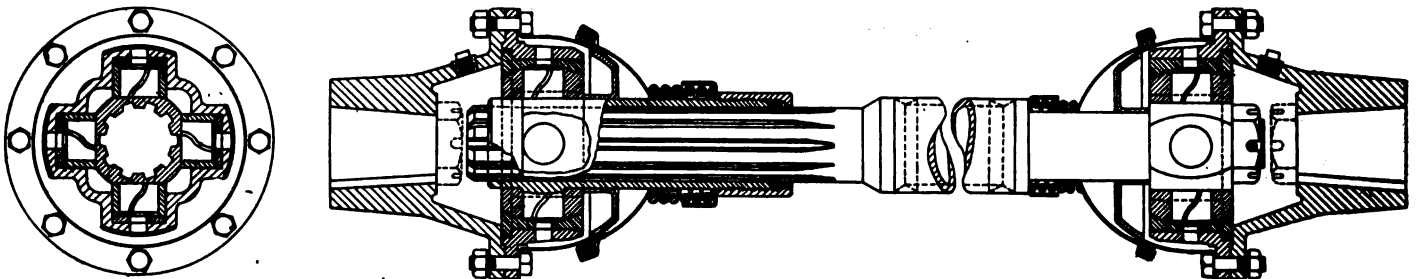
Steering is by the conventional worm and worm wheel mechanism with an 18 in. steering wheel.

The electric system consists of Wagner starting motor, generator and ignition unit, with a 90 ampere hour Willard battery. The starting engagement of the motor is by a newly developed manual shift provided with an over-running clutch. The shift has a spring follow-up motion which positively disengages the gears.

The bodies of these cars bear a marked similarity to the Nash Six bodies, but are of course smaller. The open cars are fitted with 32 x 3 $\frac{1}{2}$ in. cord tires and the closed cars with 33 x 4 in. cords.

These four cylinder cars are being built complete in the Milwaukee plant of the Nash Motors Co.

Pick Universal Joint



MOST metal universal joints now in use comprise a central cross or equivalent part and two forks connecting with the cross or ring at right angles to each other. Thus the power is transmitted from one fork to the cross or ring through two trunnion bearings, and then from the cross or ring to the other fork through the other two trunnion bearings. A universal joint in which the power is at all times divided between four trunnion bearings is manufactured by the Carl Pick Co. The bearings

in this case are arranged to slide in longitudinal slots in the ring which forms one member of the universal. All major parts are steel forgings, and the bearing surfaces are hardened and ground. The universal is enclosed in a housing composed of three steel stampings which retain the lubricant. It is made in three sizes, of 4 $\frac{3}{8}$, 5 and 6 in. outside diameter, respectively. These universals are furnished in sets together with tubular propeller shafts. S. A. E. standards are adhered to throughout.

New Aviator's Compass

THE Bureau of Standards has made a study of the Bamberg telecompass, a German instrument recently received from the Bureau's representative in Europe. This compass depends for its operation upon the characteristic of selenium, which causes a variation in its electrical resistance with any change in the intensity of illumination falling upon it. The installation is so arranged that the compass itself may be mounted in the tail of the airplane at a distance from all disturbing magnetic influences. The bowl of the compass contains two electric bulbs diametrically opposed which throw their rays through a lens which concentrates them upon two corresponding selenium cells mounted on a bridge extend-

ing across the top of the bowl. A metal disk, corresponding to the card of the ordinary compass, is cut in such shape that it acts as a blind for the illuminating elements. Thus the intensity of lighting of the selenium cells is varied in accordance with the position of the magnetic element carrying this disk. By means of a properly arranged electric circuit, the position of the magnetic element is made known to the pilot by the indications of an ammeter suitably calibrated and mounted on the instrument board. The navigator is able to direct the pilot on a desired course by means of an indicator connected mechanically to the compass in such a manner as to make possible the rotation of the bowl at will.

Extra Long Body Chief Requirement of Plumbing Trucks

The heavy truck is gradually replacing the light one among jobbers of plumbing supplies and plumbing contractors, though the latter type still predominates. Particular features are needed in a truck to meet the peculiar requirements of this industry, which presents a good market.

A NUMBER of special requirements for trucks destined to serve jobbers of plumbing supplies and plumbing contractors are described in an interesting report prepared recently by *Domestic Engineering*. The distinctive truck needs of the plumbing jobber differ considerably from those of the petroleum and concrete industries, but are nevertheless equally difficult to meet. In fact, a reading of this report, with its expressions of opinion from men prominent in the jobbing field, almost leads one to think that what the plumbing jobber wants is a 2-ton truck that will carry a 4-ton load and always be in good repair.

Though this is, of course, an exaggerated statement, it is true that the conditions to be met in the trucking problems of the plumbing jobber call for a truck with somewhat variable possibilities. Many of the articles carried by jobbers of plumbing supplies, for instance, have little bulk, but great weight. This fact tends to result in the overloading of the truck, especially in hauling to the depot. On the other hand, such articles as tanks and bathtubs have no great weight, but require a great deal of carrying space.

The chief difficulty, however, is the carting of pipe. Because of its length, pipe causes a swaying and twisting motion, which is a severe test on the short bodied truck. As a consequence, a very long bodied truck is needed to meet the needs of this particular market.

Practically all plumbing jobbers and plumbers are located in cities of some size, so that the road problem is a minor one in connection with their trucking. Some jobbers do considerable country trade, but taken as a whole, trucks used in this industry are operated over comparatively good roads.

Trucks of particular qualifications are necessary to overcome the difficulties outlined. A comprehensive survey of the field shows that the 2-ton and 3-ton truck are used most widely. Since the jobber has a number of small delivery trips to make, 1-ton and even smaller trucks are also used extensively. About one out of every ten trucks in use at present are 5, 6, or 7-ton trucks. These heavier trucks meet the service requirements in general better than do the lighter ones, but the upkeep cost, and the necessity of often running with less than capacity loads operate against their more general use. It may be said, however, that the tendency is rather toward larger than toward smaller trucks.

The superintendent of transportation of one of the largest jobbers of plumbing supplies in this country is quoted as follows: "This is the hardest business in the world on trucks. Our trucks must carry big loads, and make good time also, and very often much of the stuff is long and causes a great deal of swaying. Now, however, we are getting some trucks with extra long body and chassis—one of them has a nineteen foot body, which is

just the thing for hauling pipe. Our trucks usually have more than their rated capacity load, and make long trips...."

Another man prominent in the industry said: "Our trucks get pretty hard usage, as they nearly always carry more than their rated capacity. Our smaller trucks make from eighty to one hundred miles a day, while the heavier ones travel on an average of from fifty to sixty miles a day."

As indicative of what plumbing jobbers expect of their trucks, the following statement by an Illinois man is interesting: "In city delivering we find large trucks to be the most profitable, and we expect a truck to last about five years. At the end of that time it is better to scrap them than attempt to keep them up." Another executive counts four years as the useful life of a truck in this business. Still another says, "A truck should last five years or more, and will when handled properly."

This latter jobber adds, "The jobber of plumbing supplies in Chicago cannot use his trucks to the best advantage because of the great number of little odd lots to be delivered to all parts of the city. This is due to the unusual diversity of plumbing in this city.... Chicago represents the whole history of plumbing, from the oldest and crudest to the newest and best." This statement is interesting, as Chicago is one of the largest potential motor truck markets in this country insofar as the plumbing jobber is concerned.

Throughout the opinions expressed by a number of prominent jobbers of plumbing supplies, the general sentiment against the very light truck is noticeable. So also is the insistence upon trucks which would stand up under heavy loads and be ready for service at all times, without being in the repair shop too often.

A general survey of the jobbers of plumbing supplies indicates that there are in use at the present time about 1047 trucks in this industry. These figures are conservative, however, and the actual number probably exceeds this by a good deal.

While the jobber of plumbing supplies is the largest potential truck buyer in his field, the plumbing and heating contractor also uses many trucks. The character of goods handled by the plumber, in fact, almost demands that he use a truck, for they are chiefly iron, steel and clay, and have both weight and bulk. At first the plumber depended almost entirely upon the light trucks, such as the Ford, but his business is rapidly growing so that heavier and more substantial trucks are required.

The truck best suited to the work of the average plumbing contractor should be fast, dependable and capable of carrying from $\frac{3}{4}$ to $2\frac{1}{2}$ tons day in and day out without continually needing repairs. The 1 and $1\frac{1}{2}$ -ton trucks will probably be the most popular, while those with extra length bodies, for carrying pipe, etc., will get special attention.

Tendencies in British Engine Design Noted at Olympia

This year's show supplies a much clearer view of the British thought than did last year, when few departures from pre-war practice were in evidence. In the recent show, there were on display a number of post-war models, most notable of which were the carefully designed, small powered cars.

By M. W. Bourdon

A FAR better perspective of the true post-war tendencies of British design has been afforded by the London Show this year as compared with that of last year. Some, if not nearly all, of the entirely new models shown at Olympia in 1919 could then almost be considered purely experimental; they were certainly untested and not in any sense examples of production models. They displayed the aims and ideals of their designers rather than the final form in which they would be delivered.

This year, however, there are comparatively few cars which have not passed the experimental stage; the majority are in production, though if the truth be told there are several of which deliveries had not commenced to the public only a few weeks ago, despite their having been exhibited in their original forms last year.

Although there is not evident this year the upheaval in design which was so pronounced in a large number of cases last year, entirely new models with features departing from hitherto standard practice are to be seen. But as a rule they do not give the idea that they have set a lead which will necessarily be followed, and their individualities do not imply new ideals. As an example, the new eight-cylinder-in-line Leyland may be quoted. It has "something different" at almost every point from front springs to final drive, but most of the peculiarities are not likely to act as a spur to other makers to attain the same ends in a similar manner; they will have no such marked effect, for example, as the original introduction of the Knight engine, which unquestionably set up a new standard in quietness of running and had marked effect in that direction on automobile engines generally.

New Developments Demanded by Economy

But while there are no epoch-making developments in the fundamentals, evolution has obviously been in progress during the past twelve months, and in some cases it has left a clear imprint indicating the direction of a general tendency.

The engine of the new 50-hp. Sheffield Simplex Six may, however, set a lead that will be followed by other makers of high efficiency cars of the highest grade. It is the first private car to have the Ricardo trunk pistons, which represent a system of construction having many practical and potential advantages. Ricardo is becoming recognized as one of the ablest designers of automobile engines in Great Britain, and the list of makers using him as technical adviser is constantly being added to. His trunk piston system—originated for British tanks—appeals forcibly to those engineers who are not satisfied with the existing standards of internal combustion engine efficiency, and is now used in a British farm tractor (the Peterboro,

which did so well at the Lincoln trials) and a truck, in addition to the Sheffield Simplex car.

Not the least noteworthy feature of the show is the rapid development of a type of car which is being fostered by the shortness of money among buyers and the increased costs of fuel, taxation, tires and every other item connected with the running of an automobile. This is known as the "light car," and, although under this generic title a miniature two-seater has been inferred until quite recently, it now covers chassis weighing from 1200 lb. complete with a two-seated body to 2200 lb. with a four-passenger.

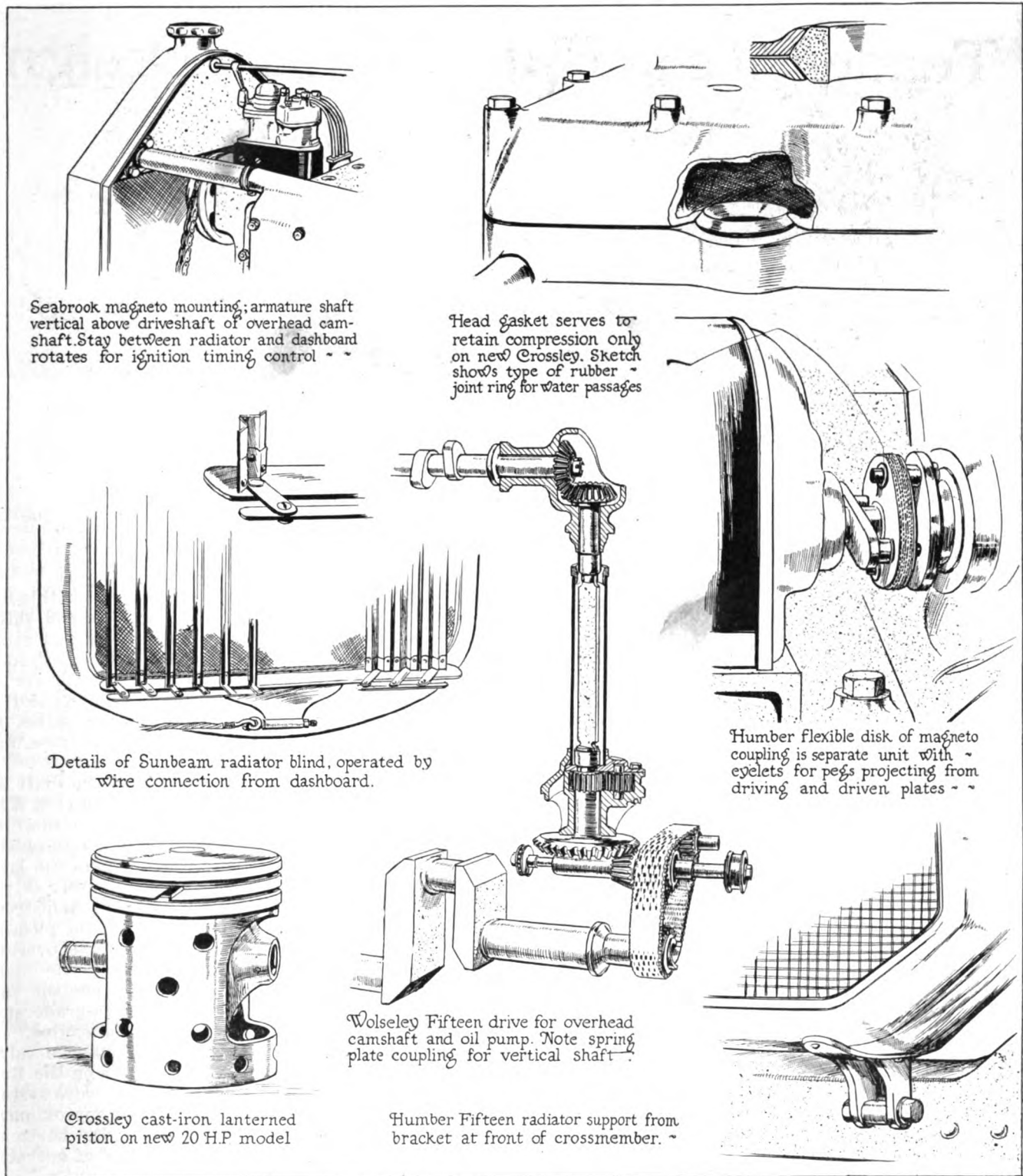
The Light Four-Seater

It is in connection with the four-passenger type that development is most pronounced. It is not a cheap car to buy; it often runs up to \$3,000 and sometimes more; the attraction which it has for prospective users lies in economy of upkeep. This type, which has an engine of from 85 to 95 cu. in., has every prospect of experiencing a small "boom" next year, and a large number of its buyers are men who are not restricted in respect of capital outlay—within reasonable limits—but whose surplus of income available for running a car has become reduced. This type of car in the future may have its effect upon American ideas and design.

There is a big jump from the type of car just mentioned to that at the other end of the scale, on which the best brains of the European industry appeared to be concentrating a year ago. There has been no falling off in the number of firms devoting their whole attention to this class of vehicle; in fact, they have been supplemented by the Leyland, the new Sheffield Simplex, Rolls-Royce, Napier, Lanchester and Ensign, while Guy, Straker-Squire, and Daimler are still specializing on cars in a slightly lower price class. There has been no reduction in price, but a tendency rather in the other direction, and though outputs are small, the limited market is still open.

Power Unit Construction

To come down to details concerning design tendencies, first consideration must be given to the engine. The great majority of British chassis have the engine and gearset mounted separately, suspended either from the main frame or from a sub-frame. This popularity of the separate mounting is explained by the fact that many makers have as yet made no fundamental changes in their pre-war design, since approximately forty of the real post-war cars have unit powerplants. Lanchester has always embodied this principle and continues it, other adherents now including Angus Sanderson, Austin and Phoenix, the latter on a



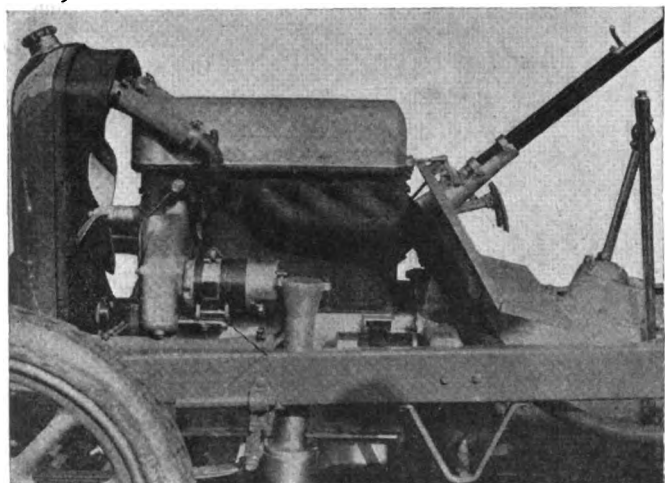
Sketches of some outstanding features at the Olympia show

new model just introduced. On the other hand, post-war chassis which have separate units include Wolseley (15 hp.), Napier, Standard, Straker Squire, Armstrong-Siddeley and Crossley.

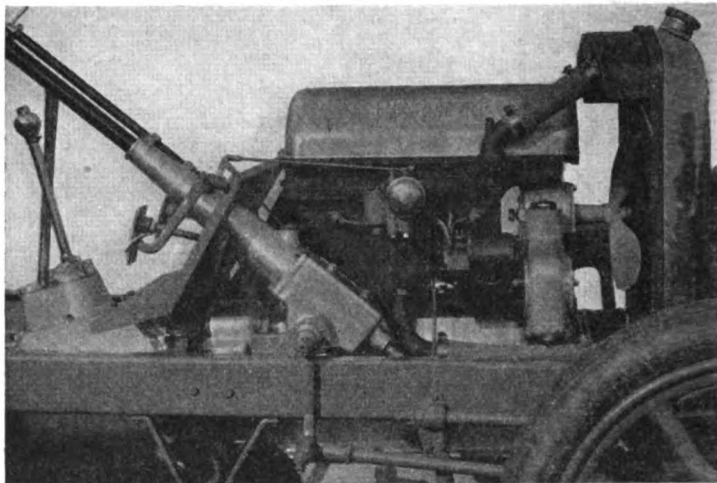
The separate engine is supported at either three or four points by the main frame, while the gearset is slung from two cross members; but in some instances, Star for example, a short sub-frame is used for the gearbox alone. When the unit powerplant arrangement is adopted, there is usually an open clutch pit, as in the Arrol-Johnston, 10-hp. Humber, Angus Sanderson and the new Phoenix. There are three or four examples (Swift is one) of engine

and gearset carried by extensions of the lower web of the main frame.

Neither with the unit system nor with the separate engine and gearset is there any general endeavor to provide a flexible three-point suspension, and this is the case whether or not a sub-frame be used for the separate units. The Guy is a notable exception in the latter class, for the sub-frame which carries engine and gearset has a spherical trunnion bearing at the front and is supported at the back by two hanging brackets swinging on the tubular cross member and having spherical joints at their lower end where the sub-frame is secured. This chassis, it may



Unit powerplant of Beardmore Eleven with overhead camshaft. Note dual water outlets from cylinder head to radiator. Bore stroke 2 11/16 x 4 1/2 in.



Beardmore Eleven (2 11/16 x 4 1/2 in.) has overhead camshaft and unit powerplant with central control. Gearset provides four speeds. Note pilot flange fixing of magneto

be recalled, is the only one of British manufacture which has an eight-cylinder V type engine. It was introduced for the first time at last year's show.

Number of Cylinders

There has been only one addition to the number of British cars with eight cylinders, the Leyland eight-in-line. The four-cylinder block cast engine is still in the vast majority, and, so far as proportionate numbers go, it has increased in favor since last year, some 70 per cent of British engines of all sizes having this number of cylinders, as compared with 66 per cent last year. Sixes appear to have lost ground, but actually no six-cylinder engine which appeared last year has been discarded, and the anomaly is due to the larger number of new models introduced in the interval with four or two cylinders. The two-cylinder engine is increasing, but naturally only in respect of small runabouts, of which quite a number are now on the market. The three-cylinder radial engine is again only represented by one make, the Cosmos of the 1919 show having dropped out and has its place taken by a newcomer. The five-cylinder radial, represented last year by the Enfield-Allday, no longer exists, for this maker has now gone back to a four-cylinder block water-cooled type, though the designer of the five-cylinder is organizing to produce it on his own account.

Cylinder Construction

For four-cylinder engines the block casting is almost, but not quite, universal. Strangely enough, one of the most notable exceptions, Singer, has a very small engine with a bore and stroke of 2 1/2 x 3 7/16 in., while another exception is a newcomer, the Blackburn. Cylinders cast in threes are general for sixes, though Straker Squire and the new Sheffield Simplex have six single cylinders, and a new make yet to establish a reputation, the Ryner Wilson, has a block cast six.

Detachable heads have appreciably increased, and are now practically equal in number with the integral heads, though if side valve engines were considered apart from those with valves in the head, the integral construction would predominate appreciably.

It is to be remarked that the system of casting cylinder block and upper half of the crankcase as a unit in detachable head engines is not increasing, the majority of new detachable head engines having a two-part aluminum crankcase. The Rover is an example of this arrangement,

also the new Crossley, two Beardmore models, the new Standard and the 15-hp. Wolseley.

Valve Position

Side valves appear to have gained ground, but this does not infer that any maker has discarded overhead valves. It implies that the majority of new makers and others with new models have preferred the L head cylinders. The only new valve-in-the-head engines of note are the Standard and Leyland, the first having pushrods and the other an overhead camshaft. Superimposed valves are used in only 3 per cent of British engines, and these made by firms of no very wide repute.

In overhead valve engines, the overhead camshaft and the push-rod systems are equally popular. Wolseley, Bentley, Lanchester, Napier and Beardmore (one model) are among those using the former, while Armstrong-Siddeley, Albert and Standard prefer push-rods. Where the latter appear they are almost invariably enclosed, either in passages through the cylinder block or, as in the Armstrong-Siddeley, in tubular casings. In either case the push-rod passages serve to return surplus oil from the overhead gear to the crankcase. As last year, only one maker has an overhead camshaft acting directly upon the valve stems; this is the Dawson, one of the high-grade small cars, which has a four-cylinder 2 3/4 x 4 3/4 in. engine.

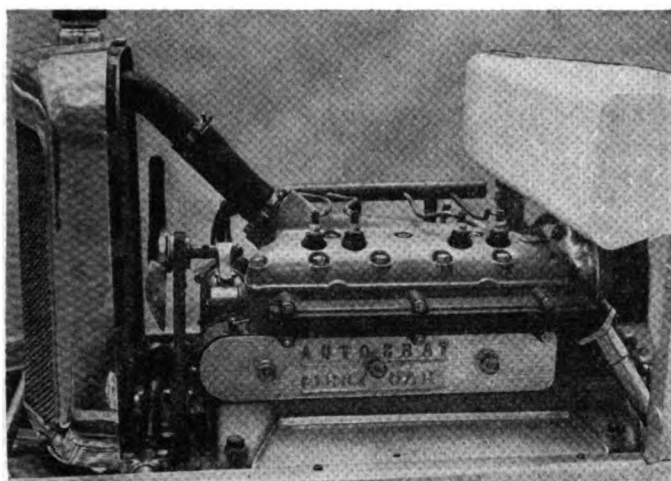
Daimler, of course, is still using Knight sleeve valves, and a new Argyll again has the single sleeve on the Burt-McCullum system. The only unusual poppet valve systems are in the eight-cylinder Guy with valves at approximately 40 deg. from vertical, and Horstmann with horizontal valves resembling the Duesenberg in method of operation.

Crankshafts

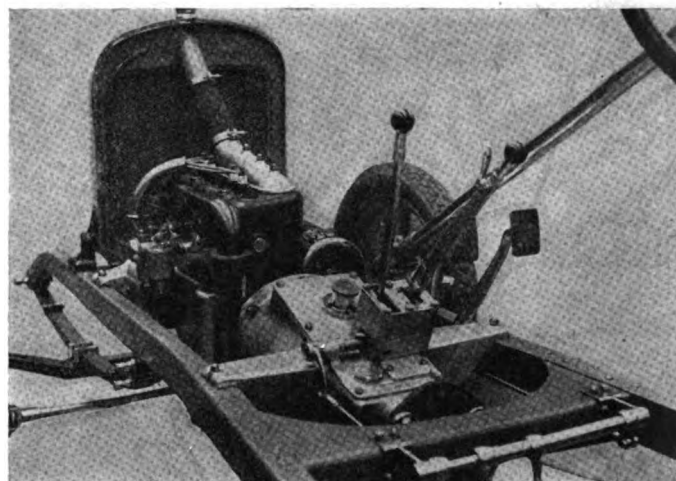
For four-cylinder engines, the five-bearing crankshaft is exceptional. Vauxhall, Austin and Crossley have five, the latter in the 25-30 hp. model (4 x 5 1/2 in.), but in the new four-cylinder 3 1/2 x 5 5/8 in. engine of this make three bearings only are used, the latter being current practice for engines about 100 cu. in. capacity, while two bearings are more general in smaller sizes.

For the higher-grade sixes seven crankshaft bearings are preferred, as in Rolls-Royce, Straker-Squire and Lanchester; but three bearings are not unknown, as witness the Armstrong-Siddeley.

Anti-friction bearings have appeared in some of the smallest engines; for example, the 12-hp. two-cylinder air-



Autocrat detachable L-head engine (2¾ x 4) has valve cover plate extended to enclosed cross shaft drive. Aluminum brackets for gravity fuel tank and sloping footboard



High grade light car powerplant, new 10-hp. Cluley with bore and stroke 2 7/16 x 4 5/16. Sells at \$2,500 with two-passenger body

cooled A.B.C., which has ball journal bearings and roller big-end bearings. The die-cast white-metal liner has lost ground appreciably, and 80 per cent of engines have phosphor bronze shells with white metal lining, trouble having been experienced with die-cast white metal breaking up. Straker Squire and Talbot run the white metal direct into the big ends and caps of the connecting rods.

There is no general move toward counter-weighted crankshafts, though a small proportion of post-war fours are so provided. Dorman, for instance, uses integral counterweights on a two-bearing shaft with 2¾ x 5½ in. cylinder dimensions; the new 3½ x 5⅞ in. four-cylinder Crossley has bolted-on counter weights with a three-bearing shaft, and Ryner Wilson has them on a six-cylinder three-bearing shaft. But there is nothing new in principle to be seen in this connection.

Connecting Rods and Pistons

The tubular connecting rod is exceptional, Armstrong-Siddeley being among the few users of tubular rods, but the latter do not serve to convey oil to the piston pins.

The ratio of connecting rod length to stroke varies from approximately 2 to 2.3. Wolseley is an example of the former and Arrol-Johnston the latter, with strokes of 5½ in. and 4¾ in. respectively.

The number of cars making use of cast iron pistons has increased compared with last year. Aluminum pistons are, however, favored by many of the best known makers and those who aim at high efficiency in power development or refinement in running, among them Lanchester, Napier, Rolls-Royce, Straker-Squire and other firms turning out high-grade cars. When aluminum is used, the slipper type of piston is frequently preferred and appears to be far less prone to piston slap than the straight-sided pattern. The split skirt straight-sided type as used by Humbers and one or two other makers has almost entirely eliminated piston slap by means of the expanding cast iron ring located in a groove within the skirt.

Cast iron pistons are almost invariably straight-sided, though both the new Crossley and the Phoenix have a lantern pattern, the skirt being cut away in the one case and recessed in the other at each side below the piston bosses, though the normal shape of the skirt is resumed at the lower end to accommodate a scraper ring.

Scraper rings in the skirt, however, are not prevalent and occur in only seven makes, the usual ring arrangement being three rings in the crown, with the groove of

the lower one beveled off and having small holes drilled through to the interior, thus enabling this bottom ring to serve a double purpose by assisting to retain compression and acting as a scraper.

Two compression rings as a rule are found only in engines of 12 hp. and under, though there is no standard in this respect, for while the 20-hp. Ruston-Hornsby has only two rings the 12-hp. Morris-Oxford has four. The latter number is, nevertheless, exceptional, appearing in only eight different engines. But Rolls-Royce goes still further and uses six, while the new Phoenix has three arranged in one groove in addition to the scraper ring in the skirt already referred to.

Steel pistons represent only 3 per cent of the total, the same as last year, but a combined aluminum crown and cast iron skirt pattern appears in a newcomer—the six-cylinder Ryner Wilson.

Prior to the war it was almost invariable British practice to fix the piston pin in the piston bosses, allowing it to oscillate in a bronze bush in the connecting rod small end; but while this is still the practice in the majority of British engines it has been displaced by the floating piston pin and that fixed in the connecting rod, in 28 and 20 per cent of engines respectively. The usual method of preventing the floating pin from scoring the cylinder walls is to fit plugs of brass, but Armstrong-Siddeley and one or two others turn a groove within the piston boss at each end and locate the piston pin by means of wire rings sprung into the grooves.

Engine Lubrication

The hollow shaft engine lubrication system has gained adherents during the past twelve months, but proportionately to the number of different makes it has lost ground. Most of the recently introduced cars have a modification of the trough system, wherein separate leads are taken to each main crankshaft bearing, and, when a silent chain distribution is used, to a point whence a stream of oil is delivered on to the inner side of the chain. The Wolseley overhead camshaft models have an arrangement of this nature, troughs being used for the big-ends and direct leads for the main crankshaft bearings, the timing gear and the camshaft and rockers.

The hollow shaft system is found on all sizes of car from 10 hp. upward, and its use on small machines is somewhat surprising in view of the success which has accompanied the trough system. The latter is undoubtedly

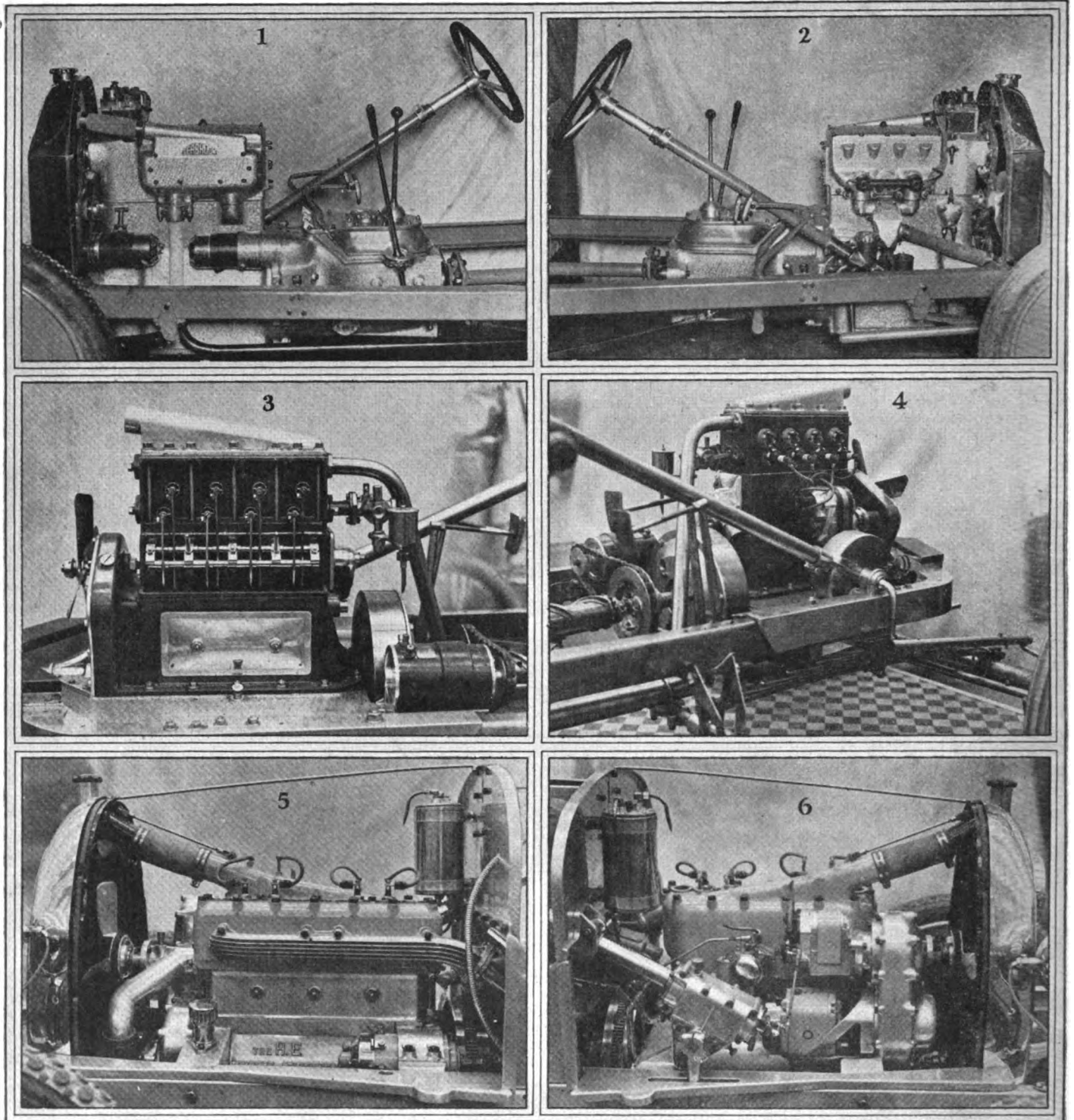


Fig. 1—Left side new Seabrook overhead camshaft engine. Aluminum cylinder block and head; latter has bronze valve seats cast in. Unit gearset provides four speeds. Chassis designed for light "sporting" bodies and introduced by late British agents for Regal cars. Fig. 2—Right side new Seabrook (British) "sports" car which has aluminum cylinder blocks with cast iron liners, overhead camshaft and magneto with armature vertical coupled to top end of camshaft drive. Thermosyphon circulation via jacket of induction manifold. Bore and stroke, $2\frac{1}{4} \times 4\frac{1}{4}$ in. Fig. 3—Left side horizontal valved Horstmann with cover plate removed. Direct-drive fan with friction clutch in boss. Fig. 4—Right side Horstmann engine ($2\frac{9}{16} \times 4\frac{3}{8}$ in.) with horizontal valves; exhaust above inlet. One of isolated examples of front cantilever springs. Fig. 5—Left side H. E. engine ($3 \times 4\frac{1}{4}$ in.) has belt-driven combined fan and pump; belt adjustment by movable rear flange of fan pulley. Fig. 6—Right side H. E. engine, showing superimposed chain-driven magneto and generator. Bore and stroke $3 \times 4\frac{1}{4}$ in.

cheaper to install, and there has been no clamor for the hollow shaft arrangement on the part of users and prospective buyers.

One light car which has the forced system throughout is the new 12-hp. Standard, for, in addition to a drilled crankshaft and leads to the timing gear, overhead rocker

shaft, and through each rocker to the socket of the push-rod, it has copper pipes attached to the connecting rods and leading to the piston pins. On the other hand, the Armstrong-Siddeley, a much larger engine with six $3\frac{1}{2} \times 5\frac{1}{4}$ in. cylinders, lacks the direct feed to the piston pins which, with the pistons, depend upon splash.

In addition to the direct feed of oil to silent chains some examples occur of a trough formed at the bottom of the timing casing to insure that the chain runs in a bath of oil to supplement the direct feed, the trough overflowing into the crankcase.

Oil Pumps

The great majority of British engines have oil pumps of the gear wheel type located in the sump and driven by skew gearing and a vertical shaft from the camshaft; but some makers still continue to mount the pump at the rear end of the camshaft, usually with an exterior suction pipe. In such cases it is usual to provide facilities for priming the pump, which is generally necessary each time the sump is drained.

Filters

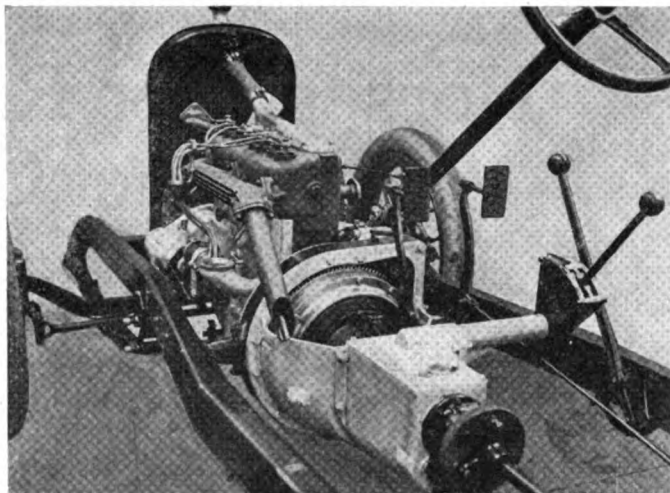
Filters of fine mesh gauze and of considerable area are more frequently used than hitherto, arranged well above the oil level in the sump, so as to permit their being removed and cleaned without waste of lubricant, but despite protests from users on this score the main filter is usually found within the sump, generally a cylinder of gauze surrounding the oil pump. This not infrequently implies a necessity of removing the sump—draining it, at all events—before the filter can be reached, a procedure which may call for the detaching of an underpan as a preliminary. Makers, in their instruction books, especially the makers who have adopted hollow shaft lubrication, lay great stress upon the necessity for keeping the oil filters clean, and while they are undoubtedly right in giving this advice and emphasizing it, one would imagine that they would endeavor to assist users to follow it by placing the filter where it could be detached and cleaned in a few minutes instead of, as is now frequently the case, this work occupying anything from half an hour to three hours. Crossley attains the desired end in the new model by providing a check valve which closes as the filter is withdrawn from the sump and thus prevents the loss of oil.

Cooling

Air-cooling has made no advance whatever since last year. It is not used on other than small cars having two or three cylinders at most. Actually the largest air-cooled British engine is a three-cylinder radial with a bore and stroke of $3 \times 3\frac{1}{2}$, fitted to a light car as yet unknown to fame—the Rubery-Lindsay. Nevertheless, air-cooling has proved very successful among the "small fry," and especially is this so in the case of the 8-hp. Rover which was introduced last year to supplement the 12-hp. water-cooled model, and has a horizontally opposed two-cylinder $3\frac{5}{8} \times 3\frac{7}{16}$ in. engine. This engine has no fan to induce a draught, the passage of the vehicle through the air being relied upon, though, in addition to the perforated metal sheet which forms a dummy radiator, air scoops are fitted to the sides of the hood to direct a draught upon the cylinder heads.

The Rover engine follows very closely upon motorcycle practice, and was criticised upon its introduction as being likely to overheat very readily; but actually it has failed to exhibit any signs of distress, even on long hills of 10 per cent grade climbed in the height of summer. Among the cars of popular price the 8-hp. Rover may be said to be the most favored and to have the largest output, approximately 20 chassis per week.

In regard to water-cooling systems, the thermosyphon and pump circulations are as near as possible equal in favor. The plan of using, in thermosyphon systems, a belt driven water accelerator arranged at the front of the cylinder jacket and coupled to the rear end of the fan shaft is not increasing, the latest introductions indicating a re-



Unit powerplant of 15-hp. Belsize. Crankcase and clutch pin bolted to rear supporting member, a ring forging with separate arms to main frame

version to a positively driven pump worthy of the name; that is, in cases other than those in which thermosyphon pure and simple is adopted.

The water accelerator has by no means proved to be entirely satisfactory. As a rule it is decidedly inefficient as a pump if it is to allow, as it is intended to do, thermosyphon circulation to occur when the impeller is stationary. Where the accelerator is of any pronounced effect in circulating the water when driven at its normal speed, overheating is encouraged by intensifying the effect of fan belt slip, for with one exception—a Dorman engine—the same belt is used for both fan and accelerator shaft.

Thermosyphon cooling without an accelerator is used on engines up to $3\frac{1}{8} \times 3\frac{3}{4}$ in., of which the Arrol Johnston and the Beardmore are examples, while the assisted thermosyphon occurs on engines up to 30 hp., for example, the $3\frac{7}{8} \times 5\frac{7}{8}$ in. Vauxhall. In respect of the last mentioned car it must be admitted that no complaints have been heard concerning the belt drive for the pump, and the criticism put forward concerning the inefficiency of accelerators generally does not seem to apply to it. It may be that many other makers endeavor to economize by fitting too narrow a belt. But whether that be so or not, there can be no question that users look upon belts for any purpose as a nuisance and are only half satisfied to put up with one for a fan drive.

There is another objection to the combined fan and water pump, belt driven. The belt cannot be adjusted by any recognized means unless another unit is driven by the same belt, making a triangulated drive, which is obviously undesirable. Actually the belt adjustment is nearly always provided by the latter method, the additional unit being the dynamo, which can be moved to and fro on its bracket. An exception is on the Horstmann, a British car with a very limited output; in this case, the belt is tensioned by means of an adjustable flange on the fan pulley, an arrangement which also appears on a British truck chassis, the A. E. C. It need hardly be said that V belts are used in both, in fact, rarely on British cars does one find any other type—the leather link V belt is practically universal.

Ignition

Battery systems of ignition have made no advance since last year in proportion to the total number of cars on the market. In fact, the magneto has a still greater lead,

(Continued on page 1067)

Horsepower Ratings for Tax in Other Countries

Almost every European country has its own horsepower formula for the purpose of calculating the annual tax on automobiles. Some take account of the cylinder bore only, others of the bore and stroke and still others of these factors and the maximum engine speed.

By P. M. Heldt

EXPORTERS of automobiles are considerably annoyed by the fact that the ratings of automobile engine horsepower for the purpose of taxation are different in the various countries. The tax rating is supposed to represent the horsepower available at the wheel rims, and usually is only about one-half of the maximum output of which the engine is capable. As the horsepower tax, in any case, is an obstacle to the sale abroad of American cars, which are usually powered considerably above the foreign average, it is well for our exporters to be familiar with the formulæ by which the tax horsepowers are calculated in different foreign countries.

In France the Central Automobile Commission calculates the tax horsepower by means of the equation

$$HP = K n D^3 L w,$$

In which n is the number of cylinders of the engine; D , the cylinder bore in centimeters; L , the piston stroke in centimeters; w , the maximum engine speed on the road in r.p.s.; K , a constant having the following values:

- 0.00020 for single cylinder engines
- 0.00017 for two cylinder engines
- 0.00015 for four cylinder engines
- 0.00013 for engines of more than four cylinders.

The above equation is applied to all four cycle engines. When the formula gives a fractional result, the next higher integral number is used for calculating the tax. In the case of two cycle engines the representatives of the Bureau of Mines, which, strangely enough, controls automobile taxation in France, will evaluate the horsepower according to the information at their disposal.

In the above formula the only uncertain value is w , the maximum engine speed under road conditions. A road test is made of each model brought out by manufacturers and presented for admission to circulation on the public highways, and from the maximum speed achieved, the wheel diameter and gear ratio, the maximum engine speed is calculated.

Translated into English measures, the above formula becomes

$$HP = K n d^3 l s,$$

where n is the number of engine cylinders; d , the cylinder bore in inches; l , the piston stroke in inches; s , the maximum engine speed in r.p.m.; K , a constant having the following values:

- 0.0000546 for single cylinder engines
- 0.0000464 for two cylinder engines
- 0.0000409 for four cylinder engines
- 0.0000355 for engines with more than four cylinders.

In Germany the following tax formula is used:—

$$HP = 0.3 i d^3 s,$$

in which

- i = number of cylinders
- d = bore in centimeters
- s = stroke in meters.

Changed to English measures this formula becomes

$$HP = 0.0492 i d^3 s$$

where

- d = bore in inches and
- s = stroke in inches.

In Italy use is made of a horsepower formula based solely on the cylinder bore and on the number of cylinders, but the constant used in the formula is different for commercial vehicles than for passenger cars. The passenger car engine tax horsepower formula is

$$HP = 0.0525 n D^3$$

and the commercial vehicle engine tax horsepower formula,

$$HP = 0.035 n D^3,$$

n being the number of cylinders and D the cylinder bore in centimeters. In English measures these formulæ become

$$HP = 0.338 n D^3$$

and

$$HP = 0.225 n D^3.$$

To show the results given by these different formulæ let us take a six cylinder $3\frac{1}{2} \times 5$ in. passenger car engine operating at a maximum speed of 2400 r.p.m.

This would be rated in France as a

$$0.000025 \times 6 \times 3.5 \times 3.5 \times 5 \times 2400 = 31.3 \text{ hp.},$$

in Germany as a

$$0.0492 \times 6 \times 3.5 \times 3.5 \times 5 = 18.1 \text{ hp.},$$

and in Italy as a

$$0.338 \times 6 \times 3.5 \times 3.5 = 24.85 \text{ hp.}$$

By the A. L. A. M. formula, mostly used for taxation purposes in this country, the horsepower of this engine is

$$\frac{6 \times 3.5 \times 3.5}{2.5} = 29.4 \text{ hp.}$$

In Belgium automobiles are taxed according to the following equation for horsepower—

$$HP = K (d^3 C N n),$$

where K is a constant whose value ranges from 3 to 3.5 for motorcycles and from 4 to 4.5 for other vehicles; d , the cylinder bore in meter; C , the piston stroke in meter; N ,

the number of cylinders and n the r.p.m. It is customary in determining the tax rate for motorcycles to place $K = 3$ and $n = 1000$ and for automobiles, $K = 4.5$ and $n = 1000$.

In Sweden the tax horsepower formula reads as follows:

$$HP = \frac{z d^2 s n}{c},$$

where z is the number of cylinders; d , the bore in cm.; s , the stroke in cm.; n , the normal speed of revolution (r.p.m.), and c a constant which is taken at 180,000 for two-stroke motors burning either gasoline or kerosene, at 220,000 for four-stroke motors burning gasoline, and at 240,000 for four-stroke motors burning kerosene.

Spain has a simple formula, to wit:

$$HP = 0.0007 nd^2,$$

where n is the number of cylinders and d the bore in millimeters.

Japan employs a formula very similar to the A. L. A. M.

formula in use in England and the United States; it reads:

$$HP = \frac{D^2 n}{3},$$

in which D is the cylinder bore in inches and n the number of cylinders.

Finally there is Hungary, which also has tax horsepower formulæ of its own, not only for gasoline but also for electric automobiles. The gasoline car formula is

$$HP = \frac{i d^2}{20},$$

where i is the number of cylinders and d the bore in cm. Electric vehicles are rated by the formula

$$HP = \frac{KG}{8},$$

where K is the weight of the fully loaded vehicle in metric tons and G the speed on level roads, in kilometers per hour.

Tendencies in British Engine Design Noted at Olympia

(Continued from page 1065)

being used on nearly 90 per cent of cars, with battery and magneto together on an additional 5 per cent. The only new adherents of the battery system are Leyland and Morris, though in the case of the latter the magneto occurs on one model. Wolseley still includes battery ignition in the specification of two models, the 10-hp. and the 15-hp., but has actually been using the magneto on many of the cars turned out up to the present.

Evidently it is expected that battery ignition will become more widely used, for it is to be noted that a large proportion of the electrical equipment manufacturers—C. A. V., Smiths and Rotax, for instance—are putting forward a dynamo battery system, and it is to be surmised that they would not have made the outlay involved unless they had some kind of assurance that there would be a market for an ignition outfit of this type. On the other hand the new Phoenix was planned for dynamo-battery ignition originally, but the sales department feared that prospective buyers would object, so a magneto has been installed instead.

Distribution

The silent chain drive for the camshaft and magneto is far and away the most popular among British manufacturers. As often as not, however, it has no means of adjustment, the percentage in which the latter occurs being practically identical with that of the non-adjustable chains. Swift, in one model, uses an idler pinion for adjusting two distribution chains simultaneously, the bracket holding this pinion being movable in either one or other of two directions. But the most usual form of chain adjustment, where it is provided, consists of a magneto bracket which can be moved away from the engine center line and carries integral with it the magneto driving sprocket and shaft bearing. Austin and Standard are two firms who adopt this arrangement, which obviously removes the necessity for shifting the magneto on its base when the chain is adjusted.

Next to chain drive, skew pinions are most favored for the distribution, the straight pinion having receded in favor of both chain and skew gear. Worm drive is used in the Ensign throughout for operating the overhead camshaft, and also by Lanchester at the top end of the verti-

cal drive shaft. The Wolseley camshaft is driven by silent chain and two pairs of bevels on vertical shafts with a flat spring steel coupling bar between the two, thus affording a slight degree of flexibility in the drive.

(To be continued.)

Method of Applying Tar in Road Repairs

IN a paper entitled "Economies in Road Maintenance," which was recently presented to the Institution of Municipal and County Engineers, J. Lang, county road surveyor, Kilmarnock District of Ayrshire, states that the tar-spraying of roads, especially in populous areas, is always a source of annoyance and discomfort, owing to the difficulty in keeping pedestrian and vehicular traffic off the newly tarred surface until it has been covered with chippings. Several methods for carrying out the spraying and chipping in one operation have recently been introduced, and the system adopted in the author's district is as follows:—A 5-ton tractor hauls a 320-gallon tar tank to which is attached a 5-ton tipping wagon filled with chippings. A flexible pipe is led from the tar tank and coupled to a sprayer fixed to the bottom of the wagon and behind the rear wheels. A V-shaped trough is placed under the back door of the wagon. The opening in the bottom of this trough can be regulated to suit the size of chippings in use. To prevent choking, a tube or shaft—with projecting spikes driven by a chain from the hub of the rear wheel—runs through the trough. A 6-ton load of chippings covers from 700 to 900 superficial yards, or 350 to 450 lineal yards by 2 yards wide, and the spraying and chipping is carried out at a speed of 4 miles per hour. Apart from the saving in labor, which is considerable, the chippings are spread more uniformly than can possibly be done by hand.

RECENT progress in gasification processes are said to have made it possible to obtain out of the 30 million BTU's in a ton of coal, 8 to 9 millions in gaseous products, 3½ millions in liquid products and 15 millions in the coke.

German Developments in Radiator Construction

Radiators with sectional cores have come into use in Germany during recent years. This type made the repair of damaged radiators a less difficult proposition, since the core consists of a number of vertical sections, which can quickly be replaced. Little brass is needed in the construction.

By Benno R. Dierfeld

THE disadvantages of the usual radiator constructions with solid soldered core are well known to every driver: A damaged radiator in most cases prevents the continuation of the journey; repairs at the garage can be carried out by the driver only with difficulty, with considerable loss of time and with special tools which are not available. The difficulties of radiator repairs at home are usually such that the damaged radiator will be returned to the factory and the car meanwhile stands idle.

For the above reasons radiators with sectional cores have come into use in Germany during the past several years. The core of the S.K.F. radiator, built by the Sueddeutsche Kuehlerfabrik Feuerbach, consists of a number of vertical sections, which, if damaged, can be quickly replaced. It has a shell of pressed steel with the usual upper and lower water tanks; the sections are attached to the tanks in such a manner that shocks or jolts on bad roads and resulting weave or distortion of the car frame do not cause leaks at the joints. Every section comprises two flat headers, at the upper and lower end, respectively, which are joined by the tubular radiator section. Upper right illustration on opposite page shows the patented joints between the header and the tank. The latter is provided with recesses into which the headers of the sections are inserted. The headers of the sections have conical depressions on both sides, into which fit the conical rubber packing rings *f*, which are unaffected by heat. These packing rings are tightened up by hollow screw bolt *e* and cap nut *g*. The hollow screw bolts have central openings for the passage of the water.

The advantages of this radiator design are that very little brass is needed for its construction, and that there is only a small number of soldered joints; if one or two sections are damaged by collision, etc., it is only necessary to unscrew the two cap nuts *g* to pull the section with its

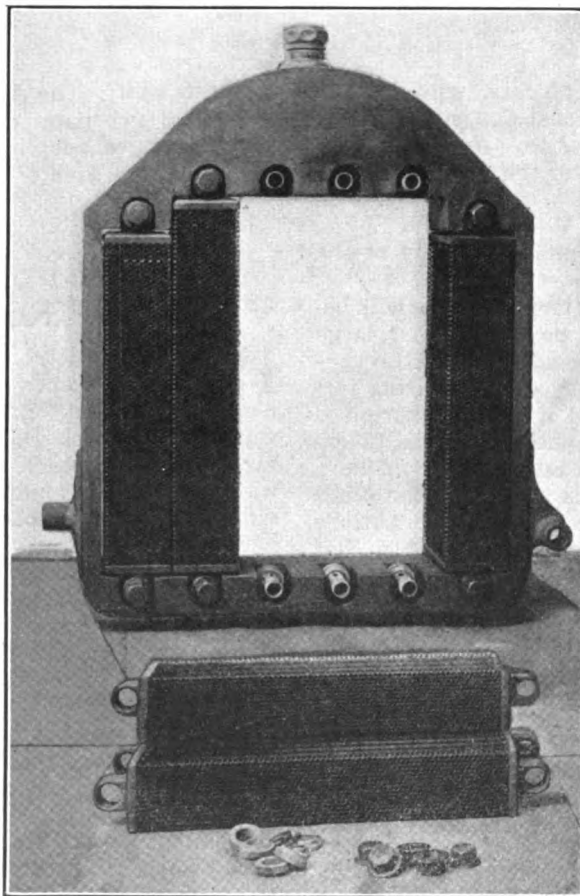
packing rings out. In case a spare section is carried along on the car, it can be put in place immediately; otherwise, the openings of the tanks are closed by special caps. The individual parts of the radiator sections are standardized, and therefore are interchangeable. This radiator is made

in three depths of core, viz., 100, 115 and 130 mm. (3.94, 4.53 and 5.12 in.) and the length of the section, measured between the cap nut centers, is standardized in a series of sizes ranging from 300 mm. to 1000 mm. in steps of 50 mm.

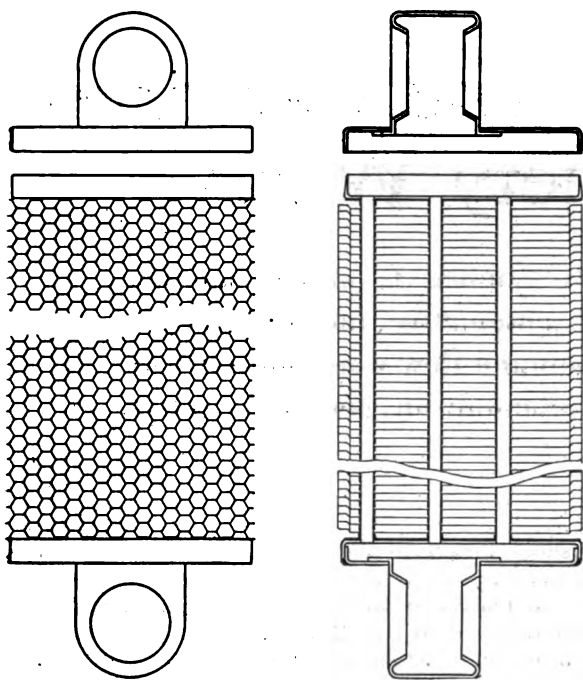
Brass and tin, the principal materials of construction used in automobile radiators, are very scarce in Germany and correspondingly expensive, since both copper and tin have to be imported. Other materials therefore are needed for this purpose; that is, materials of native production. Aluminum and galvanized sheet iron are suitable. German war experience showed that it is possible to build serviceable radiators from both materials, when proper precautions are taken to prevent electrolytic action. The electric currents dissolve the electrolytically negative metal, so that cracks or leaks soon occur at the weakest spots. For instance, in brass radiator cores the brass sheet near the soldered joints is weakened by galvanic action and its structure is so changed that it cannot be soldered again, but disintegrates when subjected to the least stress.

The water passages of the radiator core are then clogged by scale deposit to such an extent that the core often becomes unserviceable and must be exchanged. Only in the case of brass-tin radiators subjected to severe mechanical stress, as, for instance, farm tractor radiators, does mechanical injury become apparent sooner than injury from electrolysis.

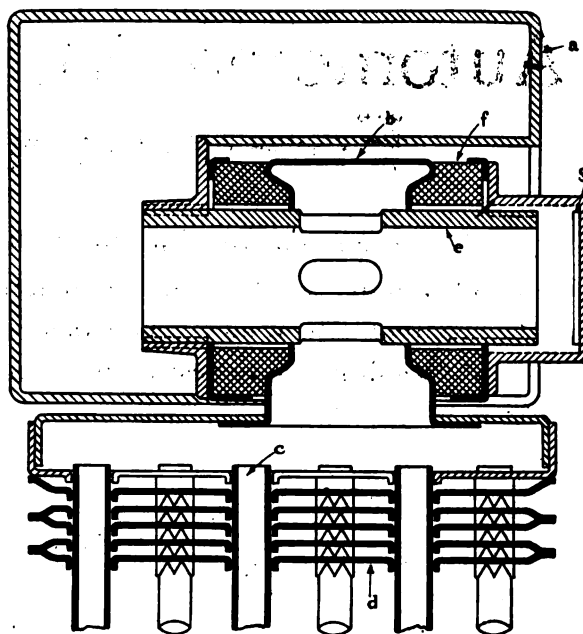
Aluminum, which can be produced in Germany in great quantities, protects itself automatically against extraneous influences by forming a layer of oxide. However, when



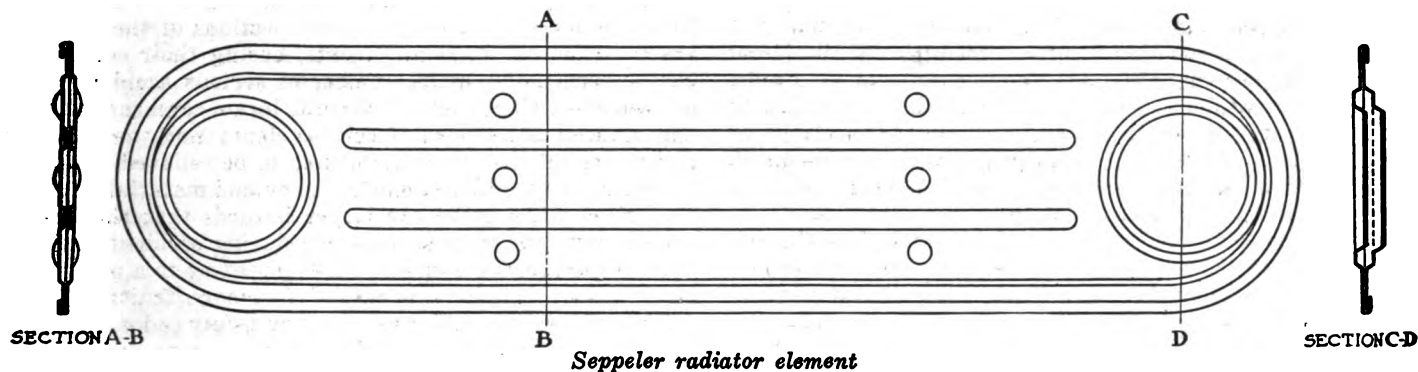
S. K. F. radiator and sections



Two views of S. K. F. radiator element



Joint of S. K. F. radiator section to tank



aluminum is used in contact with other metals, iron, for example, the oxide layer is dissolved electrolytically with the production of hydrogen, and then the aluminum is quickly destroyed, even if of considerable wall thickness and used with relatively clean water. Aluminum, therefore, must be used together only with such metals as are galvanically negative toward it, which will preserve the oxide-layer. Another plan consists in using only aluminum in the construction. All parts of the radiator in contact with water then consist of aluminum, and the aluminum radiator is separated from the engine, etc., by a rubber hose or pads and packings of insulating material. Experience has shown that such radiators are sufficiently fool-proof and have a very low weight, so that they are specially adapted for fast passenger cars.

The building of such radiators is very difficult, because aluminum of such fine thicknesses cannot be readily soldered. Therefore, in 1914 the German engineer Seppeler produced radiator cores without soldered joints using stamped and folded sheaths. These radiator sheaths can also be manufactured of iron. The individual sheaths are assembled with packing rings on two horizontal perforated tubes, that allow the passage of the cooling water. The core is held together by the case. This design has the advantage, that damaged or leaky sheaths may be exchanged or the whole core can be replaced, if obstructed by scale deposits.

As above mentioned, these radiators may also be built up of sheet iron. Now iron, in contrast to aluminum, is destroyed very quickly by rust, consequently all its sur-

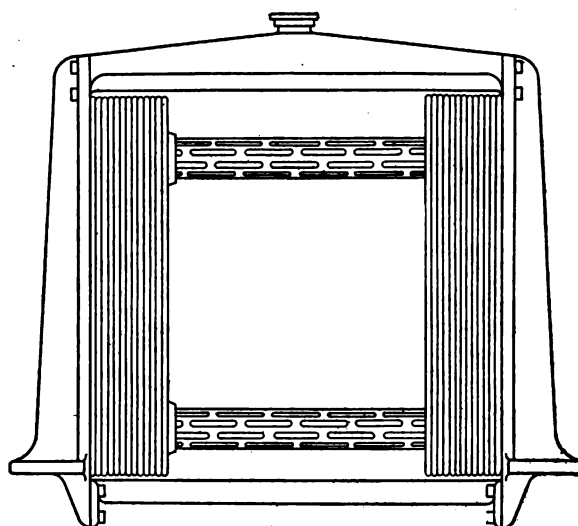


Diagram of Seppeler truck radiator

faces in contact with water or moist air must be effectively rust-proofed. The most suitable protection consists in galvanizing or zinc-coating, because the electric tension between the zinc and iron causes a protective layer of hydrogen on the iron and thus prevent rusting. If the iron is tinned the electric potential between it and the tin would be reversed, and oxygen causing corrosion would be liberated.

Automotive Vehicles and Factories Foremost in Safety Work

The recent meeting of the National Safety Council is merely another argument as to the importance of the automotive industry in our national life to-day. The factory delegates found they were interested in all sessions, and traffic questions were paramount in general sessions.

By C. A. Briggs*

THE Ninth Annual Congress of the National Safety Council, which recently convened in Milwaukee, considered a number of subjects of interest to the automotive manufacturer. In fact, there was scarcely a session of the twenty subdivisions, into which the congress was divided, that was not of more or less interest to the automotive industry.

Delegates from automotive plants found it somewhat of a problem to decide whether to attend meetings of the Metal Section, Engineering, Woodworking, Electrical or Public Safety, all of which considered problems that were vital to those who were there primarily to attend the meetings of the Automotive Section. The meetings were so scheduled, however, that one could map out a very helpful group of subjects without serious confliction.

The Automotive section of the National Safety Council was organized three years ago, when the annual meeting of the council was held in New York City. It has attained a very creditable growth and influence and to-day the section acts as a clearing house for the industry on matters of safety and other information.

The officers elected for the ensuing year are: Chairman, Robert A. Shaw, Ford Motor Co.; vice-chairman, A. L. Kaems, the Simmons Co.; secretary, R. F. Thalner, Buick Motor Co.

One of the most interesting sessions of the automotive group was the one devoted to the discussion of the power press. This subject was very ably handled by the vice-chairman-elect, A. L. Kaems. Realizing that the best way to get anything across is by the way of demonstration, he fortified himself with the generous number of power press dies which he used in convincing his audience that the punch press problem was one of proper tools and arrangement of dies, rather than costly equipment of guards. In demonstrating the use of chutes and slides, some very intricate parts were made to travel down to the dies, where an operation could be performed with absolute safety to the operator.

The rather extensive exhibit of dies and pieces of stock formed on them were later transferred to the main safety exhibit, where it attracted considerable attention.

The session devoted to the discussion of circular saw guards was profitable, as every automobile plant has been harassed by the question of how to guard saws and when to guard them.

A new idea was advanced here by Henry Scheiber of the Wisconsin Industrial Commission, who stated that a large percentage of the circular saw hazards could be eliminated by keeping the saws sharp. In this statement he had the support of several experienced wood shop men. They

nevertheless advocated the use of a practical guard along with a correctly filed saw.

The Automotive section plans to take an active part in the formation of the new National Safety Codes. In particular are they interested in the code relating to machine belt guarding.

It is the opinion of various members of the section that the State laws, as adopted in some sections of the country, are too exacting in requirements, basing their contention on the remarkably small number of serious accidents that are reported from belts. Several large concerns, having kept an accurate record of belt accidents, find them so few and so trivial that they would like to be relieved from the necessity of spending so much money and material on their protection when there are larger hazards that they could remedy with far more success in reducing accidents. Some state inspectors have stressed belt guarding to a point that is ridiculous and have neglected far more fruitful fields.

It is entirely probable that the new safety codes will have something new on belt guarding as well as on other problems of vital interest to the automotive manufacturer.

It was noted that men from the automotive industry took an active part in the discussions in the Public Safety Division. In particular were they interested in some of the laws that were suggested, many of them being considered quite drastic, especially those relating to traffic regulation.

One bright light was thrown across the rather dark picture that was drawn of the automobile as an accident producer on the street. This was when L. J. Smith, Director of Safety, Kansas City, stated in his talk on "Traffic Problems" "that the motorist is not entirely to blame in the majority of accidents, because pedestrians not only outnumber but surpass in point of recklessness the average run of automobile drivers. Nearly one out of every hundred pedestrians are 'jay-walkers' with their minds on any other subject but taking care of themselves."

It was evident by the number of representative men from such a variety of industries that the subject of safety was being considered from more than one viewpoint these days. Of course there is the big "human interest" side, but this is no longer the one big issue. There is the economic saving to industry that carries a strong appeal, and we must admit that it is the latter that gets across first in some cases.

In a very interesting speech before the convention, Marcus A. Dow, General Safety Agent of the New York Central Lines, said: "It ought to be comparatively easy to secure the co-operation of the employer in safety work, because there is such abundant proof of its value to the employer from a dollar and cents standpoint. Figures, how-

(Continued on page 1076)

* Safety director of the Willys-Overland factory.

An American Manufacturer's Attitude Toward Foreign Trade

Here is a bit of very frank self criticism. It comes to AUTOMOTIVE INDUSTRIES from an executive of one of the largest car manufacturers in this country. The truth cannot be doubted and we want to add that the conclusions are sound. How does your attitude compare with this one?

YOU cannot imagine just how much good it did the staff of AUTOMOTIVE INDUSTRIES to receive the contribution printed below from an executive of one of the largest car manufacturers in this country. This firm has not always been entirely friendly toward foreign trade, but this letter goes to show that the firm has been so entirely converted to the benefit of foreign trade that they want to pass a part of the good things on to the rest of the industry. It begins to look like foreign trade might assume something of the character of a religion. We hope so. The contribution follows:

THE following I believe is typical of the average automobile manufacturer's attitude toward foreign trade, with the exception of two or three of the larger manufacturers.

The manufacturer of a well-known, high-priced American motor car, when approached by a foreign dealer with a view of opening negotiations for the sale of the car in the dealer's country, argued against the dealer's proposition, and advanced the opinion that by the time arrangements could be terminated and the dealer supplied, business in the United States would again be so good that they would not need the orders from the foreign country.

Mind you! The manufacturer wanted the business at the time and as a matter of fact needed it to assist in bolstering up production that was low on account of a falling off in domestic demand. He seemed willing to do business with the foreign dealer, providing immediate returns were assured. His counter proposal was that the dealer arrange to at once place orders for 50 cars for immediate shipment, guaranteeing such orders by bank deposits in New York City. This proposal was made in the face of the fact that the car was practically unknown in the dealer's country.

The manufacturer's attitude being: We are willing to do business with you to help us out of a hole, providing this business shows immediate returns, but we are not willing to wait for you to develop your market, for after business has returned to normal in the United States we will be too busy with taking care of domestic business and cannot be bothered with foreign orders.

Another Instance

Another instance came to my notice wherein a dealer bidding for the sales franchise of a high-priced American car for sale in Hong Kong and the immediate surrounding district in China was informed by the manufacturer that the manufacturer would be agreeable to considering his application providing he would agree to dispose of at least 50 cars per year.

Considering the fact that the car applied for sells in this country for between \$5,000 and \$6,000 and the further fact that the whole of China only has 2800 cars in use, these cars being purchased at an average export price of

\$1,200, it is not surprising to learn that nothing further was heard from the applicant. (This figure probably refers only to the Shanghai consular district, not the whole of China.)

The whole trouble seems to be that the American manufacturer cannot understand the viewpoint of the foreign purchaser. He is inclined to look upon the foreign purchasers as people with peculiar ideas (this probably from the reason that their ideas do not exactly coincide with his own), and he is not prone to put himself out to become acquainted with the world's markets and absorb some of the tastes and sentiments of the foreign purchasers.

The sooner American manufacturers realize the fact that the big automobile future lies in the foreign markets, and prepare themselves to take care of this trade, the better off they will be.

Looking to Future

I believe we can safely predict that within the next five years fully 20 per cent of the automobiles manufactured will be sold in countries foreign to the country of manufacture.

The following figures should be of interest:

Statistics show that we have in use in the United States one automobile to each 15 persons; while in the rest of the world there is only in use one automobile to each 1176 persons.

The foreign markets, including Canada, have only consumed a matter of 1,360,300 motor cars, including both American and foreign makes as against approximately 7,000,000 being consumed in the United States.

One must of course take into consideration that the per capita buying power of the foreign countries is not as great as in our own country, but even though we reduce the figure by 50 per cent, the balance would still be greatly in favor of the foreign market.

The important questions seem to be: Will American manufacturers as a whole make a bid for this trade; and, once securing it, will they hold it by conscientious effort?

They must not lose sight of the fact that they will soon have to combat with keen competition from European manufacturers.

This meritorious competition from Europe is already being felt and, when reinforced by a natural sentiment, as is indicated by recent laws and provisions passed by some of the British Colonies, it becomes a matter that will require our very closest attention if we do not desire it to reach a point where it will be irresistible.

One thing is certain: To seek and hold the overseas trade American manufacturers must cater to the ideas of the foreign purchasers and furnish them such refinements as appeal to the European, the Oriental and the Latin-American. In other words, we must fall in line with Euro-

pean manufacturers in this respect. We must also not lose sight of the fact that a car selling for \$5,000 on our market is, after the necessary expenses of shipping, duty and profits are added, a car that sells for from \$8,000 to \$10,000 in the country of final disposal and purchasers paying this price for an American car surely have a right to expect the same refinements that they secure in the better class of European makes.

Slipshod methods of doing business with foreign dealers are a thing of the past, as the dealer is more independent than he has been during the past five years and fully realizes that he now has other sources of supply.

The important points are to first secure, and then through an unexcelled service to dealers maintain that good-will so essential to foreign transactions, and to not lose sight of the fact that domestic and foreign trade each have their own problems and the latter cannot be successfully carried on through the same channels as the former but should be a distinct and separate department of the business, and headed by one who is schooled in export problems.

Comment on the Letter

THE views expressed in the foregoing statements corroborate much that has appeared from time to time

in AUTOMOTIVE INDUSTRIES. The buyer in a foreign country must be met upon his own preferences as to refinements, styles of bodies, special equipment, finish, etc., especially in the higher priced lines, of which the writer speaks. In exporting cars of this class, the American manufacturer meets squarely the European who knows how to build exceedingly well one type of car, that which embodies sport and luxury. That class is the backbone of the European automotive industry and already competition throughout the world is becoming keen on the cars selling upward from \$5,000. As the months go by this competition may be expected to become keener, as even Germany may be expected to become an active factor.

The foreign buyer should always be met upon his own grounds. Foolish insistence in regard to equipment, to credits and to business customs which prevail in the domestic trade but do not hold in foreign markets may be the deciding factors that determine whether the business goes to Europe or America. At home, manufacturers have accepted the fact that the market has become one in which the buyer, not the seller, holds the keys. Recognition of the same factor in the foreign fields is being forced; the quicker it is accepted the quicker will the American manufacturers "get down to brass tacks" in their export merchandising.

Acetylene as an Automobile Fuel

DURING the war Switzerland turned to acetylene for use as a motor fuel, calcium carbide being a native product while petroleum products must be imported. Acetylene, however, has not proved as satisfactory as gasoline, for when F. Haber, a prominent German chemist, visited Switzerland in the fall of 1919 he did not find any cars running on acetylene, all having been reconverted. According to a book, "Acetylen im Automobilbetrieb," by Prof. C. F. Keel, director of the Swiss Acetylene Society, acetylene is only half as expensive as benzol when produced from carbide on the vehicle.

Haber was engaged by the German government to investigate the possibilities of acetylene as a motor fuel and he conducted his experiments on a 4 hp. stationary engine normally driving a generator, and on a Fiat 20 hp. automobile engine. According to Keel, 1 kg. of acetylene gave as much energy as 2 kg. or 2.5 kg. of benzol, though the heats of combustion are only as 1.2:1. The reason for this Haber found to be that there is always an excess of air in the benzol fuel mixture, while acetylene can be burned with its theoretical air allowance. When the motor was run with benzol by expert chauffeurs on level ground, the exhaust contained 6 per cent or 7 per cent of CO₂, and 14 per cent of CO; while running up hill at a slower speed the exhaust contained 7 per cent to 8 per cent of CO₂, 8 per cent or 9 per cent of CO, and further, 2 per cent of hydrogen. The combustion of benzol was thus incomplete; in tests that of acetylene proved to be complete. In the experiments of Keel, which favored acetylene, the motor had been run for maximum power, but not for best fuel efficiency.

As regards the variation of the acetylene percentage in the air mixture, Keel stated that owing to the high pressures and temperatures produced in the cylinder, the admissible limits ranged from 1.5 per cent to 7.5 per cent of acetylene; Haber sets these limits at 3 per cent and 5 per cent. With mixtures too poor in acetylene, there was noisy back-firing; with rich mixtures, pinking. The pinking is generally ascribed to spontaneous pre-ignition of the mix-

ture by the compression. Haber investigated this by driving his stationary internal-combustion motor by the dynamo (acting then as electric motor) so that the stationary motor itself served as a gas pump, the Bosch magnet being cut out. These and other experiments showed that pre-ignition was not due to the compression, but to the overheating of the gas mixture by the insulation of the plug electrode; the insulating material cools less rapidly than the metal parts, and when the insulation projected into the ignition zone, pre-ignition was observed to take place earlier, according to the richness of gas in the acetylene.

When rich acetylene mixtures are to be used, the cooling water should be kept especially cold or water should be injected into the cylinder. The injected water then cools directly, and also indirectly by diluting the acetylene; such a colder mixture is less liable to pre-ignition. It is difficult, however, to get the maximum power with pure benzol, because a third of the air, not really required for the combustion, is dragged as ballast through the engine, and the admixture of some other fuel is hence advisable.

In the tests use was made of the Kerschbaum throttle-mixer, a device which permits of controlling the amount of fuel mixture entering the cylinder without varying the proportions of the mixture. After this throttle mixer was fitted to the Fiat 20 hp. engine, it ran well on acetylene fuel, which it did not under the previous method of control, consisting in throttling the acetylene only.

ACCORDING to the report of a French investigating committee, the United States is rated as having 30,000,000 horsepower in water power, Canada 25,000,000, Norway 7,500,000, Sweden 6,750,000, Austro-Hungary district 6,450,000, Italy and Spain about 5,500,000 each. Germany's water power is estimated at only 1,500,000 horsepower, and that of England is about 1,000,000 horsepower, but it is pointed out that these two countries are richly compensated in coal.

Cheerful View of Gasoline Situation at Petroleum Institute

First national meeting of American oil interests is dominated by effort of producers to obtain from Congress equal rights with competitors of other nations to explore world's fields. Practical men assert there is a plentiful supply to meet future needs. Demand will stimulate production.

By James C. Dalton*

WHILE many side issues were involved in the discussions at the first annual convention of the American Petroleum Institute at Washington last week, the meeting was dominated by one big theme.

That theme, the one most dwelt upon by the big men of the industry, independents and others, was the determination to obtain equal rights with the nationals of other nations in the development of the unexplored oil fields of the world. There was evident a determination to obtain the backing of the American Government in this effort.

The natural assumption was that the program outlined was preliminary to an attempt to obtain from the incoming administration backing for American oil producers in an attempt to extend their operations to the far corners of the globe, and to have this stand reinforced, if necessary, by legislative action. Division of the oil fields of Mesopotamia, Turkey and the Near East among Great Britain, France and Italy was denounced in no unmeasured terms. Speakers whose names are found in the "Who's Who" of the oil industry called for a universal "open door."

Next in importance to this declaration of principles was the demand for the removal from the oil industry of government regulations which are regarded as hampering and the assertion that individuals should be permitted to develop natural resources along lines which promise greatest returns. There were warnings that the need for economy in the future will best be served by combinations of capital rather than by unrestrained competition and that enormous sums will be required for the exploitation of unexplored fields.

Another striking development was that some of the more practical men of the industry are not so much concerned over a future petroleum famine as the experts of the Geological Survey and the Bureau of Mines who have computed the probable reserves under the surface in this country and the other oil fields of the world.

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The international thread ran through the sessions from beginning to end. It inevitably brought to mind the fact that the Phelan bill providing for the incorporation of the United States Oil Corp. to develop the oil resources of foreign countries was referred to the Committee on Public Lands at the last session and undoubtedly will be

brought up by the Senator from California when Congress reconvenes next month. Under the provisions of this bill the corporation would be controlled by a board of nine directors to be appointed by the President of the United States. The directors would be appointed with "due regard for their fitness and efficiency" and would represent the geographical divisions of the United States.

The bill specifies that "the corporation may explore, develop, refine, transport and store petroleum and its products, subject to a preferential right on the part of the United States Government to take all of its supply, or a portion thereof, at any time upon payment of the market price."

The measure would empower the corporation to establish subsidiaries in any state or territory and provides that "it may solicit subscriptions of stock, and the total capital shall be determined by the board of directors."

It is stipulated, however, that it shall not enter into agreements which would cause an unlawful restraint of trade.

It was perhaps significant in connection with this bill that Henry L. Doherty, one of the largest of the independents, declared that the future capital requirements of the petroleum industry were so huge that monopoly would be impossible. He placed special emphasis upon this point after outlining his views upon evils of government regulation and interference with business. He was joined by Thomas A. O'Donnell, chairman of the board of the California Petroleum Corp. and president of the Petroleum Institute, in an attack upon what both characterized as government interference with business.

So far as the automotive industry was concerned, its

HERE is a partial "Who's Who" of the oil producers and oil experts who demanded, at the first annual convention of the American Petroleum Institute, that the Government of the United States back the efforts of its nationals in the exploitation of foreign oil fields by insisting upon an "open door" policy all over the world which would give them the trade rights now enjoyed in this country by the citizens of other lands:

W. C. Teagle, president of the Standard Oil Co. of New Jersey.

George Otis Smith, director of the United States Geological Survey.

Frederic R. Kellogg, general counsel of the Pan-American Petroleum & Transport Co.

R. D. Benson, president of the Tidewater Oil Co.

Thomas A. O'Donnell, chairman of the board of the California Petroleum Corp.

Henry L. Doherty, president of Henry L. Doherty & Co.

M. L. Requa, vice-president Sinclair Consolidated Oil Corp.

interest in the proceedings centered largely around the apparent disagreement among the oil men themselves as to the probability of an oil famine in future. The gloomiest predictions in this direction were made by George Otis Smith, director of the United States Geological Survey, in a paper on "A World View of the Oil Supply." He backed up his position by a recital of impressive statistics which showed that the present and probable future consumption in excess of current production was little short of alarming. He qualified the figures, however, by the statement that it was impossible to determine accurately just how much oil there is under the surface of the earth.

Smith's views were not shared either by Doherty, O'Donnell or R. D. Benson, president of the Tidewater Oil Co. Doherty said he had told representatives of the automotive industry that present users of motor vehicles, their children and their children's children never would have to worry about where the next day's supply of gasoline was coming from. He was confident, he said, that new and unexpected fields would be found in all parts of the world, and he also pointed to the enormous shale supplies. He declared that substitutes for petroleum cannot be produced economically.

Doherty placed motor vehicles at the head of a priority list for which fuel must be found. Next in order came motor boats, airships, lubricants and paraffines. He paid tribute to the part played by motor vehicles in winning the war, and declared that the cause of the Allies would have been lost but for their help because of government regulation of railroads. He added that the development of the internal combustion engine had opened to agriculture vast territories for the production of food.

A firm stand was taken by Doherty for the right of Americans to enter into competition with the producers of other nations in all the fields of the world. He asserted that the Standard Oil Co. had been "hamstrung" by a court decision while foreign monopolies had been left free to go their own sweet way. He warned the producers of the country that they must try to keep from being "hamstrung" while trying to make the government see the importance of taking a hand in the world development of oil.

In his address O'Donnell scouted the probability of an oil shortage, denounced government regulation and called for government co-operation with its citizens in oil developments abroad.

"The public has been frequently alarmed," he said, "by statements of well-meaning and learned scientists predicting an early exhaustion of our petroleum resources, in some instances giving more or less definite figures as to the supply still obtainable and setting a time for exhaustion within the limits of the lifetime of men now engaged in the business. There are many important petroleum deposits even within the boundaries of the United States that these men have not yet located or taken into their calculations.

"Petroleum is widely distributed throughout the world and, I believe, in sufficient quantities to meet the requirements, present and future, and if the economic law of supply and demand is given a free opportunity to assert itself, and artificial, political and governmental restrictions are removed, allowing everybody from everywhere to participate in the prospecting and production necessary, there will be plenty of oil to meet the requirements in all parts of the world for many generations to come. An assurance, however, of stable property rights and private ownership is necessary to encourage the prospector, with his vision of wealth, to get busy.

"During the history of petroleum in America there have been many ups and downs as to supply and demand. In each period of increased consumption and shortage of production there have always been frequent and loud predictions that the source of supply was exhausted and there never again would be sufficient oil to supply the demand. In every instance these predictions have been wrong.

"Increased prices have always resulted in increased activity of the wildcatter, which in turn has resulted not only in producing sufficient oil to meet the demands but in bringing about an over-production. There is nothing produced by man anywhere so responsive to the economic laws of supply and demand as petroleum. . . .

"Agitation by government officials, statesmen or politicians is just as dangerous as governmental regulation and interference. It destroys stability, credit and confidence as to the future. There is nothing we produce that needs the incentive of visions of wealth and the stability of property rights to a greater extent than petroleum.

"The danger now confronting us, which is really serious, is not caused by exhaustion, but is likely to occur through the foolishness of men in permitting restrictions caused by too much government. In addition to our known petroleum deposits and the new discoveries that are sure to occur we have enormous shale deposits in the western part of the United States as a reserve in case of need, but a proper active development throughout the world will produce our petroleum requirements so much cheaper than is possible to operate the shale beds, that I do not anticipate any important development in the shale during this generation.

"In the national interests, in the interests of the petroleum industry in this country, and in the interest of the people of the world, we ask our own Government for no special privileges anywhere, but we do ask for a friendly co-operative spirit by our Government in the interest of American citizens and American capital engaged in the development of the petroleum industry abroad.

"We ask for no financial assistance by our Government except to use all proper means to stabilize and protect property rights where honestly acquired. The petroleum industry of this country has the necessary talent, energy, resources, and will to take an active part in the development of this very essential product, which would be in the interest of all people everywhere."

Benson of the Tidewater was optimistic as to the future. In closing his review of the situation he said:

"I believe that production in the United States will be entirely governed by the price paid for crude oil, for a longer period than anyone, no matter how learned, can safely predict; and I will close as I began, by voicing my father's belief that Kind Providence never limits the supply of anything so valuable as petroleum. To this I add only that price will bring production, and that territory still unknown will be found to meet the needs of future generations as they arise."

Director Smith of the Geological Survey joined with the oil men in stressing the importance of seeking new fields.

"There is urgent need," he said, "for pioneering the world for oil to meet the needs of this generation, but there is no warrant for regarding this advance into new fields as beginning a contest whose aim is world conquest. The present need of the United States for oil from abroad can be met only by world-wide exploration, development and operation by American companies backed up by our Government; and we should expect other nations that are embarrassed by a similar or even greater discrepancy be-

tween consumption and production to adopt the same policy.

"The first thought in either a national or a world program for oil is to stimulate production. 'More oil needed' describes the symptom felt by every nation, and new and larger supplies of oil is the remedy sought.

"Plainly, the common interest in a limited resource is not served simply by regulation of price. It is of greater consequence to the public, either the people of a single nation or humanity as a whole, that the best use rather than the freest use be made of an invaluable resource. The danger that lies in cheapness is the wastefulness of to-day that will lead to the consequent scarcity and corresponding high prices of to-morrow.

"The oil problem can be solved only through a keener realization of the world's future needs and a stronger determination to serve future interests. Any taking over of the rules of war into the economic competition for new supplies of oil or for markets for oil products will waste a limited resource as well as threaten world peace."

Smith emphasized the menace of depleted oil supplies for the future and pointed out that development of shale reserves would mean higher prices. He advocated the open door policy which "need not involve throwing away the key," and said much could be gained for all nations by pooling the world's petroleum resources. He asserted that the coal resources of the country were adequate to meet all its power needs for 57,000 years, but that if oil were used for the same purpose the visible supply would last only 9½ years.

The greater production of gasoline, he said, had been at the expense of lubricating oil, which he held was the more important of the two. In pointing out the importance of lubricants he declared that even government regulation should be provided to enforce the greatest good to the greatest number. The use of gasoline in "pleasure" automobiles, he asserted, finds no economic justification. Trucks and tractors must be given first place in the line at fuel stations, he said, adding that the country must make the best use of its fuel resources.

In this connection he urged more widespread use of water power to generate electricity, and pointed out that it could do much of the work now being done by oil. "The world has not enough oil," he said, "to burn under either stationary or locomotive boilers." Economy must be exercised and wastes of fuel avoided through the elimination of much of the small competition which now prevails in various branches of the oil industry, Smith contended. He added that the price of coal has increased out of all proportion to the price of oil.

The growing importance of oil in international relations was stressed in the address of W. C. Teagle, presi-

dent of the Standard Oil Co. of New Jersey. In effect he served notice upon the world that if other nations persisted in giving oil monopolies to their nationals in the unexploited fields of the world the United States would be compelled in self-defense to adopt retaliatory measures.

If other nations persist in this attitude, he declared, while relying upon the United States for a large share of their present day needs, then, and in that event, this nation will have no alternative but to take cognizance of the attitude of foreign governments, and as a matter of necessary self-protection to consider the adoption of measures reciprocally to conserve its petroleum resources for its own people.

"YOU are all generally familiar with the terms of the San Remo agreement, proposing a division of Mesopotamian and other Near East territory between the British and French, and the tripartite agreement recently entered into by Great Britain, France and Italy defining the spheres of influence in Turkey which is susceptible of diplomatic inquiry as to its true meaning.

"You know that Persia is almost entirely limited to the development work of one English company, that a Dutch company enjoys almost a complete monopoly in the Dutch East Indies; that Japan restricts development of petroleum properties to her citizens. The French provided by the act of Sept. 9, 1919, for complete nationalization of all mineral resources.

"If foreign governments insist on pursuing the policy of nationalizing oil lands, and reserving sub-soil rights to be held under government direction; if they persist in attempting to keep all of their own petroleum deposits for their own future benefit, while relying upon the United States for a large share of their present-day needs, then, and in that event, this nation will have no alternative but to take cognizance of the attitude of foreign governments, and, as a matter of necessary self-protection, to consider the adoption of measures reciprocally to conserve its petroleum resources for its own people."—W. C. Teagle, President of Standard Oil Co. of New Jersey.

"The United States has no desire to interfere with the political relations of any power with a colony, with a protectorate or a mandated area, but when it is proposed to use these relations to create exclusive economic spheres within which the development of natural resources is to be confined to the parent or dominant country and to extend and buttress these exclusive alliances, we are justified in raising our voices in protest against establishment of a system which we believe to be unjust, injurious and unwise.

"With its position in world trade and the economic and financial weapons ready to hand, the United States could undoubtedly compel a new allotment of foreign oil territory so as to give it a share of what other nations are now proposing to keep for themselves. But we do not propose this. Might never makes right, and the smaller countries without similar means of forcing their way into such a division deserve better treatment at our hands."

Preliminary to this declaration of principles, Teagle re-

ferred to the terms of the San Remo agreement, proposing a division of Mesopotamian and other Near East territory between the British and French and the tripartite agreement recently entered into by Great Britain, France and Italy defining the spheres of influence in Turkey, which is "susceptible of diplomatic inquiry as to its true meaning."

Teagle pointed out that the United States is spending its petroleum wealth for the world's benefit in order to meet 70 per cent of the world's present demand, and added:

"Domestic crude is not sufficient even for current home demands and it is absolutely imperative that American petroleum producers proceed actively and intelligently to develop oil resources in foreign lands. They are particularly fitted by past experience and training for this work."

A statement designed to reassure American producers as to the aims of Great Britain in exploiting the world's oil fields was made by Richard Airey, vice-president of the Roxana Petroleum Co. Motives which have been as-

cribed to Great Britain of seeking to create a monopoly over the potential oil lands of the world are untenable, he said. The United States enjoys the balance of power in petroleum in her own possessions, and in addition controls by far the greatest share of the production in Mexico. Her holdings in Central and South America are greatly in excess of the aggregate held by all other countries.

"So strongly entrenched is the United States in the great world reservoir of oil," he declared, "that it would be well nigh impossible to take the lead away from her, even assuming that there was the slightest evidence of a desire to do so. It requires the highest qualities of statesmanship and commercial enterprise to bring about a more normal state of affairs, and it seems to me that the entrance of the nations of Europe into the petroleum fields will go a long way to bring about the early return of normal business conditions."

Frederic R. Kellogg, general counsel for the Pan-American Petroleum & Transport Co., controlled by Edward L. Doheny, denounced bitterly the confiscation of oil lands in Mexico, and called upon the Government for the protection of American interests there. His statements in this respect resulted in a request from R. V. Pesquiera, special representative of Mexico in this country, for a hearing, and it was given at the closing session of the convention.

Conservation was considered by M. L. Requa of the Sinclair Consolidated Oil Corporation, another recruit taken by the industry from the Bureau of Mines. He declared that the consumption of fuel oil, natural gas and gasoline is inexcusably wasteful and advocated centralization of conservation efforts in the hands of the Petroleum Institute. He said that from 10,000,000 to 15,000,000 barrels of gasoline are lost in this country each year through inefficient handling and storage and that at least half this could be saved. He also pointed to waste at refineries and to the losses from pipe lines, which are very heavy. He decried secrecy about refining processes, which really are

known to all, and in this respect echoed George Otis Smith, who intimated that the Government has the power to throw open to everyone use of the Burton process for cracking. Referring to the automotive industry, he said:

"The requirements of automotive transportation, particularly truck and tractor, are growing so rapidly that a supply of motor fuel can only be assured for future years by giving the utmost attention not alone to economy of operation, but also to the more difficult problem of adapting the engine so as to permit the maximum increase in the fuel supply. The problem of co-ordinating engine and fuel is thought by many engineers to represent one of the most important issues now occupying the field of automotive transportation. Is the co-operation between the automotive industry and the petroleum industry in the solution of this problem effective; is it serious, and can it be made still more satisfactory?"

Requa said he had a horror of governmental control or supervision save in the broadest terms, but he warned the oil men they must expect such control if they lacked efficiency in self-government.

The case of the automotive industry was presented at a general session by C. F. Kettering of the General Motors Corp. as the mouthpiece of the Society of Automotive Engineers and the National Automobile Chamber of Commerce. H. L. Horning was chairman of the section which considered efficient utilization of fuel oil, motor fuel, lubricants, etc.

In view of the predominant part played by international oil relations at the convention, it was considered significant that Norman H. Davis, Under-Secretary of State, reconsidered his acceptance of an invitation to speak at the annual dinner of the institute. He announced at the eleventh hour that pressure of official business made it impossible for him to be present. "Petroleum as an International Problem" was the subject which had been assigned to him.

Automotive Vehicles and Factories Foremost in Safety Work

(Continued from page 1070)

ever, do not alone awaken in the heart and mind that spirit that is really needed not only on the part of the employer, but on the part of the employee as well, if safety work is to attain the full measure of success.

"There have been some employees who have not achieved great success in safety work because even though they pretend to inaugurate safety work, they were not safety men at heart. Experience has proved that success in this work springs from the heart and a determination to concentrate every resource necessary upon the obtaining of results.

"A life saved is a life saved, whether it be in spectacular

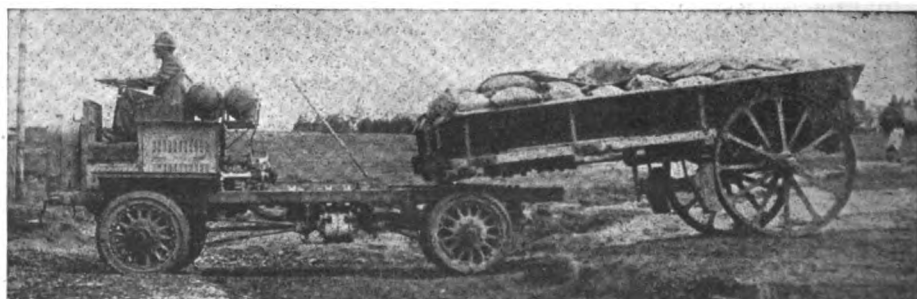
fashion with the world applauding the hero, or whether, by the application of approved safety devices, a worker is kept from being ground up in the gears of a machine."

According to C. M. Talbert, Director of the Department of Streets, St. Louis, the automobile is rapidly forcing the growth of the council, which is as yet in its infancy.

The next annual meeting will be held at such a time and place as the board of directors designate, but the opinion seemed to prevail that the East would claim the next convention. Boston and Pittsburgh were mentioned and Buffalo boosters advanced strong arguments.

New Type of Trailer for South Africa

A new type of trailer manufactured by the South African General Electric Co. (branch of the General Electric Co., New York) for the S. A. Railways. The truck used for testing was an F. W. D. These trailers are being made in South Africa



Organized Research Into Highway Transportation Problems

The automotive industry is much interested in this development of the work by the National Research Council, which is to study the design, materials, machinery, financing and use of the proposed national highways of this country. Government Bureaus already co-operating.

By Clyde Jennings

AN organization that, it is hoped, will bring intelligence and system into the highway building efforts was formed when the Advisory Board on Highway Research of the National Research Council resulted from a meeting held in the Engineering Societies Building in New York recently.

There were present at this meeting representatives of the American Association of State Highway Officials, Emergency Division of the Committee on Economic Theory of Highway Improvement, Society of Automotive Engineers, Bureau of Public Roads, Emergency Division of Committee on Structural Design of Roads, National Automobile Chamber of Commerce, Division of Geology and Geography of the National Research Council, American Institute of Consulting Engineers, Western Society of Engineers, American Automobile Association and a number of university faculty members.

Prof. C. A. Adams, chairman of the Division of Engineering, National Research Council, called the meeting to order and briefly stated the object. Dean Anson Marston of the Engineering Department of Iowa State College, named as chairman of the day's session, made an impressive statement of the general problem awaiting solution.

He said that the person approaching the highway problem must not think in terms of good roads, but must think of billions of dollars, billions of miles of vehicle travel, making this into a problem that directly affected the everyday life of every person in the country. He said also that lack of knowledge of the expenditure of this money is very costly, and that there is a need for many research committees because there are many things to be studied. Further, there is no accepted type of road structure and cannot be any type that will be acceptable for conditions that are confronted in all sections of this country of varied climate and soils. One present Iowa problem is the removal of a hill. It is known that the work might cost \$160,000 but whether the benefits to be gained will justify that expenditure are not known.

The vision of a Jules Verne is needed for the engineer who will look into the future of transportation. Then, as if in contrast, the man who does the other research must get down to the practical, instead of the theory. He expressed the hope that when this work is organized, the chairmen of the several committees will be workers, men paid to answer the questions presented to them and to give the proper attention to a co-ordination of the efforts of the workers under them.

Thomas H. MacDonald of the Bureau of Roads, mentioned the immense sums of money that are being put into road construction, and expressed the wish that all of those concerned with the problem would forget the "good

roads" designation of the subject and consider it as a transportation problem. There are now, he said, three automotive vehicles on every mile of road in this country, and there would be an increasing number. These vehicles, he said, were vital to the people of the country.

Roy Chapin of the N. A. C. C. presented a practical side that had been mentioned by Dean Marston. The need of a research into the methods of financing roads, so that the road would not be entirely destroyed before the bonds were retired. He met the challenge of a question by assuring those present that the automotive manufacturers and engineers were always ready to redesign their vehicles to meet conditions, and that the manufacturers were as anxious as any other persons to have an economical car for proper highways.

Professor Aff of the Iowa State College, and A. T. Goldbeck of the Bureau of Roads, described briefly the research already undertaken, and promised results in the near future. A member of each organization represented was called upon and all were agreed as to the bigness of the problem.

The by-laws adopted set forth the following objects of the Board:

- a To assist in outlining a comprehensive national program of the highway research and coordinating activities thereunder;
- b To organize committees for specific problems;
- c To deal with ways and means;
- d To act in a general advisory character.

There was some discussion as to the membership of the Executive Committee. It was the opinion of most of those present that the Executive Committee should be selected from the Advisory Committee, which will be composed of representatives of the member associations. But it was explained that all work done under the National Research Council, because of the nature of the Federal Executive Order, must be done under the direction of the Division of Engineering of the Council. So it was decided to have the executive committee consist of three members of the Engineering Division. There will be a director, an engineer, who will devote his entire time to the research work and who will direct the various committees. The committees provided for in the by-laws are:

- a Bibliography,
- b Economic Theory of Highway Improvement,
- c Structural Design of Roads,
- d Character and Use of Road Materials.

The financing of this venture into research is placed in the hands of a Ways and Means Committee.

French Cars Make Excellent Showing in Fuel Competition

There has been considerable discussion in this country of a possible official fuel competition. The French industry has held such a competition under closely controlled rules. The results, as interpreted in this article, are worthy of careful consideration by American manufacturers.

By W. F. Bradley

AVERAGING 28.3 miles to the American gallon, a Voisin sedan with sleeve valve 3.7 by 5.5 in. four-cylinder engine with a total weight of 5324 lb., won the French fuel economy competition and established a world's record for this class of performance.

The competition was run on a closed circuit near Le Mans, guarded by troops and having official controllers at distances of not less than one hundred yards. The amount of fuel to be allowed to each competitor was calculated in advance and was based on piston displacement, weight and nature of the body. Under this arrangement all the cars were started practically at the same time, and the one covering the greatest distance was the winner. The four-cylinder Voisin sedan, driven by Cabailot, ran out of fuel after covering 136 miles. Second prize under this rule fell to an entirely different kind of vehicle, a Chenard-Walcker pneumatic-tired tractor hauling a four-wheel pneumatic tired trailer loaded with bottles of beer. This combination covered 124 miles on 16 gallons of fuel, or at the rate of 7.7 m.p.g. The Chenard-Walcker has a four-cylinder 3.1 by 5.5 in. engine, and the total weight of the combination was 19,550 lb.

Kind of Fuel Optional

A standard four-passenger Citroen, as delivered to clients, but with special carbureter tuning, got third place with 50.9 m.p.g. The highest mileage per gallon recorded by any of the eighty odd competitors was 76.1 for a four-cylinder two-seater Peugeot Quadrilette driven by a French technical journalist under the nom de plume of Paul Chap. This type of machine was brought out by Peugeot about a year ago, and had tandem seating. Chap had a special body built with side-by-side staggered seats. A large number of Citroens averaged better than forty miles to the gallon.

Under the rules competitors could use any kind of fuel they liked, but the allotment was made on bulk, and not on weight. The majority preferred benzol to gasoline. Two grades of gasoline are available in France, heavy and light; only a few preferred the former to the latter. One machine ran on pure kerosene. This was a Unic four-cylinder five-passenger weighing 4386 lb., which was given 3.7 gal. of kerosene, on which it covered 66 miles, or at the rate of 17.9 m.p.g. The Unic engine has 4 by 5.9 in. cylinders and employs the Bellem system of direct injection of kerosene into the combustion chamber.

A Fiat 1½-ton truck on pneumatic tires used 60 per cent benzol and 40 per cent kerosene, with the Payenhet carbureter, and averaged 11.6 m.p.g., with a total weight of 7197 lb. The truck had been bought from the French army stores. Another Fiat, with a four-cylinder 3.1 by

5.5 in. engine, hauled a light trailer, making its total weight 5346 lb., and averaged 19 m.p.g.

Americans Made Poor Showing

America was represented in the competition by a Scripps-Booth, several Fords and one Cadillac. Although fitted with European carbureters, the Scripps-Booth having a Claudel and the Cadillac a Standard, these two were last in their respective classes, the former averaging 24.7 m.p.g. and the latter 12.9. The best Ford performance was put up by Leroy with 22.7 m.p.g., using the Ford carbureter with modifications. Delbecker, a Claudel expert, had a higher average, with 26.1, but went a shorter distance. He worked under a handicap, for he had adjusted his carbureter for benzol and was given gasoline instead.

Owing to the present high cost of fuel in France, where a gallon of gasoline averages \$2.10, the greatest interest was attached to these trials. Practically all the cars were entered by manufacturers, by carbureter makers, or by dealers interested in some particular carbureter. Elaborate precautions were taken to prevent dodging the rules. Special gravity tanks had to be fitted for the competition, and the ordinary tanks had to be emptied. Electric starters were all disconnected before the competition began. The course measuring only about eleven miles round, it was possible to guard it very efficiently, and both troops and observers were placed around at close intervals. The entire course was marked off at intervals of 100 yards, and each observer given a hundred yards section to control. When a machine came to a stop with its tank empty, it was a simple matter to check up its distance between the hundred-yard posts.

Engines Warmed Up in Advance

It was permissible under the rules to warm up the engine before starting, and everybody took advantage of this to the full. About ten minutes before the start the main tanks had to be emptied, and this meant stopping the engine, but precautions were taken to conserve the heat thus obtained during the preliminary running. Some of the drivers ran their water to boiling point in order to have a correct temperature after the engine had cooled off a little while waiting for the actual start. All realized the necessity of running at a fairly high temperature, and radiator muffs or screens and radiator thermometers were commonly employed.

The Voisin team made the most careful preparations for the competition. In view of this test the compression of the two engines was increased to 113 lb. Both the sedan and the open touring car had bodies specially designed by

Gabriel Voisin to reduce air resistance to the lowest possible figure. The competition gasoline tanks were shaped like a torpedo and mounted on the top of the hood, the outlet being at the front end, direct to the carbureter by gravity. Both men drove for economy, and on the hairpin turn, where the road had been plowed up, they stalled on a couple of occasions. In order to show that he had power in reserve when required, Artault ran his last lap at 60 miles an hour.

Kinks on Improving Economy

There were several cases of hot water injection. On one of the cars a lead was taken from the top of the radiator and another from the top of the dashboard gasoline tank, and the two brought into the inlet manifold, with the idea of getting a steam and gasoline vapor into the cylinders.

The six-cylinder Excelsior, which had two Claudel carbureters, had the intake pipes wrapped with coils of copper pipes circulating water. In addition there was a lead from the radiator overflow to the mouth of the carbureter, so that the engine was always aspiring steam or hot air. On one of the Majola cars an attempt was made to recuperate heat units from the exhaust. A pipe connected to the exhaust was brought up to a filter on the forward face of the dash, and the gases then led into the intake manifold. It was claimed that a certain number of heat units were put back into the cylinders.

Competition by Formula

It being the first time a fuel economy competition had been held in France, the formula under which fuel was allotted was more or less an experiment, and this was admitted by its author, Charles Faroux. It proved to be very successful. Two other formulas were therefore adopted in addition. In order to take speed into consideration, the formula

$$R = \frac{PV}{C}$$

in which P equalled total weight, V speed and C consump-

tion, was used, with the following result:

1. Voisin, Artault.....1527 points
2. Voisin, Cabaillet1248 points
3. Rolland-Pilain, Pilain.....1035 points
4. Citroen, Barbier

Another classification was made on the basis of fuel cost per passenger per hundred kilometers (62 miles), gasoline being taken at the average price around Paris. The results, reduced to cents per mile per passenger, were as follows:

	Cents
1. Citroen, Barbier	0.757
2. Voisin, Cabaillet	0.800
3. Citroen, Penaud	0.874
4. Buchet, Brouin	0.884
5. De Dion, Bocchi	0.957
6. Citroen, Chateau	0.978
7. Sigma, Pelissier	0.990
8. Peugeot, Chap	1.055
9. Sizaire-Naudin, Carteau	1.072
10. Sigma, Raguenet	1.115

Under this formula the competitors using benzol had some advantage for the cost of this is \$1.60 per gallon, compared with \$1.90 per gallon for gasoline. These are prices just outside Paris, where cost is lowest.

FRENCH FUEL CONSUMPTION TRIALS TEN BEST PERFORMANCES, IRRESPECTIVE OF CLASS

	Weight, Lb.	Fuel, Gal.	Miles C'v'd	Miles Per Gal.	Ton Miles Per Gal.
1. Voisin, Cabaillet	5324	4.8	136	28.3	75.4
2. Chenard-Walcker, Lagache (Trailer) ..	19,550	16	124	7.7	75.2
3. Citroen, Barbier	2568	2.2	112	50.9	65.3
4. Peugeot, P. Chap....	1201	1.3	99	76.1	45.7
5. Sizaire-Naudin, Carteau	4122	3.3	96	29	59.8
6. Citroen, Repusseau ..	2579	2.2	96	43.1	55.5
7. Voisin, Artault	3968	3.1	94	30.3	60.0
8. Mathis, Flambarbard ...	2204	1.9	93	48.9	53.9
9. Citroen, Chateau	2590	2.2	90	40.9	53.0
10. Mathis, Lahm	1984	1.6	89	55.6	55.1

Motor Cars in Portuguese Africa

STEADY increases are being recorded in the motor population of Portuguese East Africa, although the use of these vehicles is confined principally to the city of Lourenco Marques. An estimate that about 200 passenger cars and 20 trucks are owned in that city is made in a letter just received by AUTOMOTIVE INDUSTRIES from John A. Ray, the American Consul there.

Portuguese East Africa, according to the Consul, now has a white population of about 10,000, half of whom live in the capital city. The climate varies from tropical in the north to subtropical in the Lourenco Marques district, and although some tin and copper are mined near Beira, the chief business of the province is tropical agriculture. Outside of sugar, the only manufactures of importance are of soap and cigarettes. The province exports sugar, copra, oil seeds, cotton, sisal, maize, beeswax, wild rubber, mangrove bark and hardwoods. In addition, there is a large export of Transvaal coal through Lourenco Marques and of Rhodesian chrome and copper ores through Beira.

Consul Ray adds that some confusion results from a misunderstanding of names of the province and its capital. Portuguese East Africa, he explains, is frequently called Mozambique, as the official designation of the entire territory is the Province of Mozambique. However,

the city of Mozambique is the capital of Mozambique only, the capital of the province being Lourenco Marques. Further confusion is added by the fact that there is a chartered company known as the Company of Mozambique, which administers the territory surrounding Beira.

The province has a total area of 293,884 square miles and a coast line of 1380 miles, which possesses several excellent harbors, the most important being Lourenco Marques, Inhambano, Beira, Chinde, Quelimane, Mozambique, Porto Amelia and Ibo. The capital and Beira have railway connections with the South African system.

In discussing trade and business generally, Consul Ray says:

"There is steamer connection with the United States and the rest of the world. The general customs policy is liberal and the terms of credit are similar to those usual in South Africa. Commercial ratings are obtainable through regular agencies or through the Lourenco Marques banks, the Banco Nacional Ultramarino, Banco Colonial Portugues, Standar Bank of South Africa, the National Bank of South Africa and its branches, and the Banco de Beira. Although the official language is Portuguese, English is generally understood in commercial circles."



The FORUM



Truck Weights and Road Wear

Editor AUTOMOTIVE INDUSTRIES:

The editorial in your issue of Oct. 21, entitled "Road Wear and Types of Final Drives," discusses a subject of the gravest importance. This subject probably will have a direct influence upon the future of road and vehicle design, construction, maintenance and administration.

We know that static load imposes no serious stresses in the road slab.

We know that the slab is seriously stressed by impact shocks.

We know that impact shocks increase in proportion to the vehicle speed raised to approximately the one and seven-tenths power and also in direct proportion to the unsprung vehicle weight.

We know that vehicles equipped with pneumatic tires impose practically no impact on the road slab.

For the consideration of a committee formed to appear before the special commission appointed in New Jersey to investigate such matters I proposed the following schedule for license fees:

Horsepower

Pneumatic tires	\$0.25 per hp.
Solid rubber tires.....	.25 per hp.
Metal or other hard tires.....	.25 per hp.

Unsprung Weight

Unsprung weight includes the weight of axles, wheels, tires, steering arms, tie rod, and also one-half the weight of drag link, springs, radius rod, torque arms and drive shafts, if vehicle is shaft driven. This data to be furnished to Secretaries of State and Motor Vehicle Commissioners by the National Automobile Chamber of Commerce and to be stamped on caution plate of new vehicles by manufacturer.

Pneumatic tires	\$1.00 per 100 lb.
Solid rubber tires.....	2.00 per 100 lb.
Metal or other hard tires.....	3.00 per 100 lb.

Sprung Weight

To be obtained by subtracting the unsprung weight from the allowable gross weight which is now stamped on caution plate by the manufacturer. Allowable sprung weight to be stamped by manufacturer on caution plate of new vehicles.

Pneumatic tires	\$0.05 per 100 lb.
Solid rubber tires.....	.10 per 100 lb.
Metal or other hard tires.....	.15 per 100 lb.

Weight Restrictions

Maximum allowable gross weight on any wheel 11,200 lb., distributed not more than 800 lb. per inch of tire width, said width in the case of rubber tires to be measured between the flanges of the rim.

Maximum allowable unsprung weight on any wheel 1960 lb., to be distributed not more than 140 lb. per inch of tire width, said width in the case of rubber tires to be measured between the flanges of the rim.

Minimum allowable distance between axles, 4 ft.

Solid rubber tires must be replaced when worn to within one inch from the rim.

On homemade or orphan vehicles previously licensed where it is impossible to calculate the actual unsprung weight the following procedure can be followed:

Place a weighing jack under each wheel in turn. When a wheel has been jacked clear of the road, read and record the gross weight on that wheel. With the gross wheel weight supported by the weighing jack place an ordinary jack with proper blocking under the frame as near the axle as possible. Raise the frame with this second jack until the bushings at either end of the vehicle spring indicate that they are floating on the spring shackle bolt, the weight indicated on the weighing jack will then be the unsprung weight on that particular wheel.

The difference between the gross wheel weight and the unsprung wheel weight of a vehicle loaded to capacity will give the sprung weight on which this portion of the license fee should be figured. If a vehicle is not loaded to capacity at the time it is weighed, the calculation of the license fee on unsprung weight should include a sufficient amount to bring the body weight allowance and pay load up to the manufacturer's rated capacity. The pay load capacity of a passenger vehicle shall be the sum of the adult seating capacity multiplied by 150 lb.

Everyone has agreed that users of the road should pay for road maintenance in proportion to the damage which they inflict on road surface. I believe that the suggested schedule of license fees will accomplish this result.

As an example of how this would work out with existing equipment, let us consider the license fee for a 2-ton shaft driven truck on pneumatic tires.

Horsepower—25.6 × \$0.25.....	\$6.28
Unsprung weight—20.75 cwt. × \$1.00...	20.75
Sprung weight—83.65 cwt. × \$0.05.....	4.18

Total \$31.21

The present fee is \$17.50.

The fee by bill No. 331 would be \$60.00.

The same vehicle on solid rubber tires would pay:

Horsepower—25.6 × \$0.25.....	\$6.28
Unsprung weight—20.75 cwt. × \$2.00....	41.50
Sprung weight—83.65 cwt. × \$0.10.....	8.36

Total \$56.14

The present fee is \$29.00.

The fee by bill No. 331 would be \$60.00.

Now let us consider the fee for a 5-ton shaft driven truck on solid tires:

Horsepower—40.0 × \$0.25.....	\$10.00
Unsprung weight—43.75 cwt. × \$2.00..	87.50
Sprung weight—179.25 cwt. × \$0.10....	17.90

Total \$115.40

Present fee \$53.00.

The fee by bill No. 331 would be \$210.00.

The same 5-ton vehicle with chain drive, or any drive which reduces the unsprung weight, on solid tires:

Horsepower—40.0 × \$0.25.....	\$10.00
Unsprung weight—37.75 cwt. × \$2.00..	75.50
Sprung weight—179.25 cwt. × \$0.10...	17.90

Total \$103.40

Present fee is \$51.00.

Fee under bill No. 331 would be \$195.00.

INTERNATIONAL MOTOR COMPANY,
D. C. FENNER, *Public Works Department Mgr.*

No Bench Tests with Next Year's Grand Prix

Editor AUTOMOTIVE INDUSTRIES:

I have read, with much interest, your article on Rules of the Grand Prix de France, published in your issue of Oct. 7.

We are entirely in accord regarding the fact that the preliminary bench test was a dangerous and difficult thing, which could have undoubtedly rendered the Grand Prix a failure.

Ralph de Palma, whom I saw yesterday, said the same thing and added that a similar requirement for next year will bring no American entries.

I am sorry that the Automobile Club of France should continue to ignore the A. A. A. as well as the great American automobile papers, since our club informed the A. C. A. about one month ago, that the regulations had been changed, and that for the 1921 Grand Prix, they are exactly the same as those of Indianapolis.

I must inform you of the foregoing, in the plainest possible terms, so that American manufacturers will know the truth and understand our spirit.

I wish to add that at the present moment it looks almost certain that the Grand Prix de France will be run at Strasbourg, at a place quite near to the region of the American battlefield, where Americans, of course, are particularly well-liked. The French desire is very keenly to see many entries of your country for next year's race, and I thank you in anticipation of your readers informing through your excellent revue, that there will be no preliminary bench test the coming year.

CHARLES FAROUX.

Revision of Contract Prices

Editor AUTOMOTIVE INDUSTRIES:

You are undoubtedly aware of the pressure which is being brought to bear on the independent steel sheet manufacturers by the automotive industry to either revise their prices downward or else accept cancellations. The steel people are now trying to make it appear as though the automobile manufacturers were welching on their contracts.

The independent sheet manufacturers belong to the National Association of Sheet & Tin Plate Manufacturers which adopted about four years ago a supposedly "irrevocable" contract form. The literature sent out at the time by the association bore the legend: "Sales contracts to be valid must obligate the buyer and seller."

In fact, the independent sheet manufacturers violated these contracts time and again during the flurry of last spring and summer when they failed to make deliveries in accordance with specifications furnished them by the automobile manufacturers. Under their contract form,

they would have been obligated to pay to the buyer the difference between the contract price and the sky-high premiums then prevailing. I know of no instance where any automobile builder received such reimbursement from the sheet people in spite of the fact that many were compelled to go into the premium market and pay \$85 for sheet bars and exorbitant prices for converting these bars into sheets.

It is only natural that the same people should now refuse to consider contracts which were so ruthlessly violated by the steel mills then, other than as "scraps of paper" now.

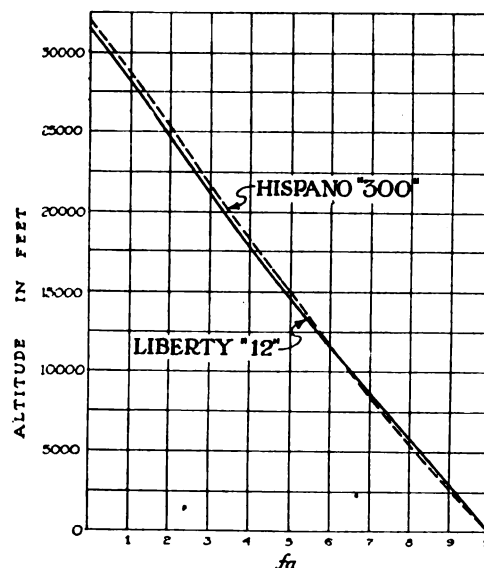
It has always been an unwritten law in the steel industry that contracts for semi-finished steel could be cancelled at buyer's pleasure, but that once he had furnished specifications, he was more or less obligated to take the finished steel. Even then, however, cancellations have been so frequent that they have almost become a custom of the trade. It is absurd for the independent sheet makers to assume the role of martyrs whom the automobile builders are trying to "do" by not taking from them sheets at twice their honest value.

WILLIAM CRAWFORD HIRSCH.

The Variation of Horsepower with Altitude

J. E. Schipper

IN a report signed by L. V. Kerber, of the Engineering Division, Air Service, McCook Field, Dayton, Ohio, the variation of horsepower with altitude is discussed. An empirical chart has been arranged by Mr. Kerber and is shown in Fig. 1. This curve applies to a propeller efficiency of 100 per cent at the ground. To find the horse-



power at any altitude of a propulsive system consisting of a given engine and propeller, multiply the factor at that altitude from Fig. 1 by the brake horsepower of the engine corresponding to the revolutions per minute expected at maximum ground speeds and by the efficiency of the propeller at that revolution per minute and speed; that is,

$$HP_a = f_a \times HP_g \times \text{efficiency}_g$$

Curves for the Liberty 12 and the Hispano-Suiza 300 are given.

Industrial Autocracy Has a Danger All Its Own

Every one knows of the feudal system and its evils. Perhaps you thought that all of these evils were disposed of before America became a world power. Can political democracy and industrial autocracy operate together? This article indicates that some of these evils exist today.

By Harry Tipper

SOME years ago, when we were entering the war, in addressing a group of editors in regard to the relations between employers and employees, I asked this question in opening up the subject:

"We have found it impossible for one democratic nation to exist continually in peaceful contact with a neighboring autocratic nation. How long will we find it possible to run our own nation with a political democratic system and an industrial autocratic system?"

The purpose of the address was to show the essentially autocratic character of the manufacturing system which had grown up through the introduction of machinery, and the use of new methods. Not long ago, Mr. Dickson, vice-president of the Midvale Steel and Ordnance Company, made an address before the American Society of Mechanical Engineers, in which he refers to this point and refers to it so clearly that I am quoting exactly from his speech.

I believe there is a grave menace to our American ideals in the highly centralized, autocratic control which is becoming a marked tendency in our great industries. The feudal system was based on the ownership of land and its appurtenances—such as highways, mines, streams, fisheries, etc.—by the barons, and it was effective in securing automatic control of the workers, because the vast majority were tillers of the soil, or workers in other industries controlled through land ownership.

The tendency of our modern industrial system is toward autocratic control of the workers through ownership of what our socialistic friends term "the tools of production," which include not only the natural resources, but also the furnaces, mills, factories and transportation systems.

Instead of indulging in glittering generalities, let me cite two instances on what has happened under the existing system of corporate control.

Some years ago, a gentleman at the head of one of our great corporations decided that prices must be maintained in the face of a diminishing demand. In order to accomplish his purposes he restricted production by shutting down a number of large plants located in different communities, each of which had been built up largely as an adjunct of the plant.

Some of these plants were kept closed for about a year, and the result was disaster to the communities. The merchants were driven out of business, real estate values were depreciated, and the workers were thrown on their own resources and had to break up their homes and seek employment elsewhere. None of these persons had any voice in the momentous decision, which was made in a New York office and which resulted in social paralysis in all of these communities.

This last summer the president of one of the largest tex-

tile companies suddenly announced that his mills would close for an indefinite period, and they were closed in the same arbitrary, autocratic manner as above described.

The facts which he has stated as indicating the autocracy which has developed in connection with the operations of the modern industrial system are only two samples out of innumerable instances which could be mentioned. The old feudalism was eliminated in the countries as they progressed, because the people refused to exist any longer under a system where all the materials of economic necessity were owned by the feudal land owners, and it is inevitable that the unrest among the workers will continue until they feel that they have some essential partnership in the economic tools and operations of to-day.

Not long ago a large manufacturing concern decided to give up its plant in a State located on the Atlantic seaboard and move about a couple of hundred of miles further inland. As Mr. Dickson said, of the cases he cited, in this instance the workers had nothing to say about the matter at all. The company decided for reasons of advantage to itself that it would move its whole equipment from the one point to the other. This move affected about 20,000 people, and they could either move with the plant or take their chances upon getting some other work. Some of these workers had lived in the town for years.

The employees of the concern were members of the council, they were interested in the churches, their children were going to high school and other schools. From the time that the decision was made, there was six months in which they could decide on their own movements. The town from which they were moving did not have more than 70,000 population and there were no other big manufacturing concerns. The town to which they were going had a population of about 150,000 inhabitants, and the concern that was moving its plant did not undertake to provide houses or schools or churches or the community spirit which they were leaving.

All men who have been engaged in manufacturing for a number of years can recite instances of a similar character.

Supposing the feudal landowner decided to move about, move his farms from one point of his land to another and to rearrange the work on his land. The people were obliged to accept his decision because they had no other choice. We look back upon those days, call those people slaves and thank God we are living in another generation.

The ownership of the building, machinery, processes, money and the other tools of production or distribution is so completely in the hands of the owners of industry and its disposition so definitely in the hands of the industry, that the worker has no voice either in the character of his

work or the decision in respect of his work, unless the organization of industry is rearranged sufficiently to provide for it.

It is encouraging to note a statement of this kind by the executive of a large industry, as indicating that some business men are beginning to recognize the autocratic character of the present industrial organization, no matter how benevolent that autocracy may be or how much it may desire to foster the well being of the workers from its own ideas and plans.

This is the background of the struggle in Great Britain and other European countries, for a complete change in the system of industrial and political development. In Great Britain particularly the autocracy of industry has a longer history with a much larger record of failure, of mistakes and of exploiting the worker.

The growth of socialism and the intimacy between the labor unions and the socialistic parties is due to the same desire to escape the autocracy of industry, even, although in escaping therefrom, the worker may establish an autocracy of labor.

The present efforts in Great Britain to return to the Guild System of operation or a modified form thereof are due to the same cause, and it is not without interest to note that a prominent feature of the propaganda for this form of operation has been "the ownership of the tools of production by the workers engaged in the industry."

The labor occurrences in Italy indicate the out-cropping of the same desire, and it is this which has been at the back of the labor union development, the severity of its discipline and the strength of its organization.

The matter is mentioned here again because we have lost sight of the fact that the old feudalistic autocracy, out of which we have grown, was an economic autocracy and was associated with the political autocracy only because the economic advantage grew out of the land ownership, and land-ownership was a political matter.

It is mentioned also because endeavors to establish changes in industrial organizations must have as their basis a desire to create a fuller and freer discussion of matters pertaining to the work, the worker and the conditions of his work, and to provide him with a voice in the decision upon these matters, which will bring him into some share of the government of his own conditions in respect of industry.

The danger in the open shop lies in its misuse by short-sighted manufacturers who imagine that this open shop will enable them to return to the older and more completely autocratic methods of control and

oblige the worker to accept their authority and their decision without regard to his desires or his own feelings upon the matter.

The president of an organization of manufacturers not long ago read to the body assembled a letter from a labor union to its members, in which there appeared the sentence: "*They will get busy one of these days, and when they do we must be ready to repair the damage done.*"

When this sentence was read, the president of this association of manufacturers added the parenthetical remark: "*God help them when they do!*" and the remark was applauded by the assembled party. Any statement which that manufacturer and that association may make, as to the labor leader's autocratic control of a labor union, must be discounted completely because the expression which he has used is a complete indication of the autocratic control which he intends to exercise over his own workers.

It is power in industry, exercised by men of this type, which increases the bitterness and which defers any reasonable prospect of solution. Industry will not be benefited by those who fight for domination on either side, and it is up to the industrial leaders and manufacturers who control the tools of production and distribution and who therefore control the destinies and possibilities of the workers, to take the vs. from between capital and labor themselves, by their own study, their own knowledge and their own far-sighted action in connection with the manufacturers.

The manufacturer who thinks that the present situation will settle the labor problem for him and that he has no need to look at the stream before it is necessary to bridge it, is imagining vain things. These human tendencies are too deep and they have been developing strength for too long to be disposed of by a temporary economic condition. In Europe they transcend all other questions and in this country they will eventually transcend all other questions, unless we employ sufficient intelligence and human understanding to lay the foundation for their settlement.

It took a good many centuries for the workers under the old feudal system to destroy feudal autocracy. The movement of trade unionism and the movement of socialism have grown very rapidly in just over a century, so rapidly that we are in danger of failing in our recognition of this growth. The direction of the movement is unmistakable. The strength which it has gathered is definite and the lesson which it carries to the manufacturers should be easily read.

This lesson is: The solution of the problem lies in a degree of square dealing, wisdom and study which the unions have never attempted and with which they are unable to compete.

Asphalt Roadway Specifications

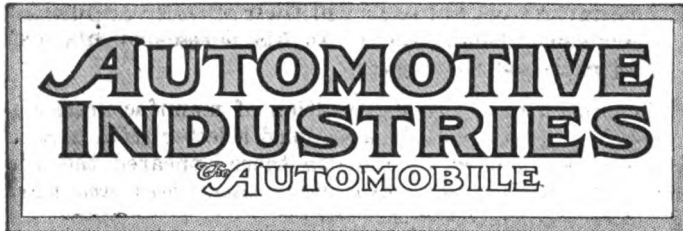
THE Asphalt Association has ready for circulation in printed form the following typical specifications prepared by its technical committee, which is composed of highway engineers and specialists. In the preparation of these specifications special attention has been paid to form and arrangement with the idea of making them definite, concise and free from ambiguities.

- A-1 Asphalt Macadam Surface Course.
- A-2 Asphaltic Concrete Surface Course (Coarse Graded Aggregate Type).
- A-3 Asphaltic Concrete Surface Course (Fine Graded Aggregate Type).
- A-4 Sheet Asphalt Binder and Surface Courses.
- B-7 Asphaltic Base (Asphalt Macadam Type).

A limited number of the following specifications in mimeographed form may also be obtained upon request:

- A-5 Asphaltic Concrete Binder and Surface Courses.
- B-1 Gravel Base.
- B-2 Macadam Base.
- B-3 Reconstruction of Old Macadam to Serve as Base Course.
- B-4 Telford Base.
- B-5 Portland Cement Concrete Base.
- B-6 Truing Up Old Pavements to Serve as Base Course.
- C-1 Preparation of Subgrade.
- C-2 Sub-base.
- C-3 Shoulders, Headers, Curbs and Gutters.

Specifications for Asphaltic Base (Asphaltic Concrete Type) will be available for distribution in the near future. The address of the association is 25 West Forty-third Street, New York.



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Automotive Industries—The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907, and The Horseless Age (semi-monthly) May, 1918.

42 Legislatures!

THE elections are over, but it is not by any means the time for business men to forget their interest in politics and government. Indeed, it is time to begin to get interested.

Forty-two legislatures will meet shortly after New Year. Think of it! Forty-two bodies that will convene with their minds filled with ideas of revising taxes and eliminating trouble and death from the traffic situation.

This means, of course, that each of these forty-two law-making bodies will have automotive vehicles on their collective minds. The motor car and its less spectacular brothers are in the public eye as never before. Just as the industry has been the object of a more or less jealous drive of every other industry, so the vehicles will be the object of a drive for revenue taxes from all sources that are seeking to escape some degree of taxation.

The coming period will be one that will require cool heads and thoughtful consideration on the part of men

who must advise, intelligently and fairly, these lawmakers in their work of legislation. The representatives of the automotive industry should prepare themselves for effective and intelligent lobby work. They should have reliable statistics. They should have a copy of the "Proposed Uniform Vehicle Law" which the N. A. C. A. and other national organizations have drafted and then use these effectively.

Wages and Selling Prices

A SUCCESSFUL Chicago manufacturing concern on three occasions within the last year found it necessary to reduce prices on certain lines in order to successfully meet competition. Since their previous prices had not been excessive, it was necessary that some change in production take place if the lower price were to be made and a fair profit still realized.

It was decided that increased efficiency and increased production per man was necessary in order to meet the condition successfully. To obtain this result, the men in the shop were called together by the superintendent, the situation was explained to them, and they were shown that if they increased their efficiency the firm could meet this new condition, continue production without interruption, and thus provide steady jobs for them through slack periods. Then a general raise in wages was instituted.

This procedure occurred three times during the last year and a half; the last time being about six months ago. In every case, the men as a whole appreciated the aims of the management, and in every case the desired production results were achieved. A few men, of course, played the part of the "yellow dog," but the superintendent of this plant is authority for the statement that the number of this type was so small as to affect but slightly the generally good results.

"In order to reduce your price and yet maintain the same fair profit, increase wages." This statement may sound foolish; it is foolish, in fact, if considered alone without relation to a number of other factors. Yet it is interesting to note the case of a firm, doing a large business with the automobile manufacturers, that has done just that thing—and a number of other things. And this particular firm is now operating with its full complement of men, on full time, and is working four evenings a week overtime. Quite a record for a time generally considered to be one of business depression.

It is always dangerous to draw general conclusions from a single example or experience, but when such excellent results have been achieved they are at least worth noting. And it is worth consideration when discussing the possibility and desirability of lower wages in the near future.

Strengthens the Farm Market

THERE has been a considerable turn of sentiment recently against the "uplifter" and his work among the farmers. This note was sounded strongly at the recent convention of the National Implement and Vehicle Association. Now we have a letter from

a reader of AUTOMOTIVE INDUSTRIES who has much interest in farms and farming, as well as in automotive vehicles. His advice is practically that which the N. I. V. A. has adopted as its platform, and which our correspondent suggests that the automotive industry adopt.

This is briefly that the entire country quit extending pity to the farmer and farm boy, but consider them as members of the biggest producing and manufacturing interest in the world. Consider the farmers as business men and analyze their problems as you analyze the problems of other industries. When you talk transportation to a farmer, talk it just as you would to the owner of a steel plant. When you talk loans to a farmer, talk to him just as you would to another manufacturer, but keep in mind his slow turnover of his stock. Remember always that the farmer has financial problems of his own that are real, not fancied, and that his plant is quite equal in worth to a good many merchants and manufacturers who buy transportation.

The farmer is the biggest bank depositor and what he needs is confidence to talk straight business to his banker, not encouragement to put himself in the position of a suppliant, asking for this loan as a public benefit. The manufacturers are making long strides toward the elimination of professional "welfare" from their own overhead, now they should do equally good work in eliminating the professional "uplift" from the farm situation. It would do much toward making the farm market a stable market.

Exchange and Exports

THE upward turn of foreign exchange during the first part of the Thanksgiving week should be gratifying to all exporters of American goods, particularly automotive products. The exchange situation in the markets of the world is practically the only bar to continued heavy buying of the automobiles, trucks, tractors and tires manufactured in the United States. When the values of foreign currencies reach a more normal level, an expansion of automotive exports should ensue that will dwarf the recent movements.

But that is perhaps thinking too far ahead. The ascending curve that has been so remarkable in the last few days may not mark the definite and final turning point, but it is at least an indication that business is reaching again toward a stabilized basis. Exchange goes upward or downward as trade balance ascends or descends and foreign business, which includes both imports and exports, must strike an equilibrium so that each country may sell to and buy from other countries the particular goods of its production.

Automotive equipment is one of the particular goods of American production, which we offer on the foreign markets in exchange for the finished goods and raw materials. The present movement of exchange may prophesy the coming normalization of these exchanges. If so, the curve of automotive exports should ascend as does the currency movement. No other bar exists throughout Latin-America, the Far East, England, North Europe, Spain, Africa and

other parts of the world which form the principal sales outlets for our manufactured goods.

But, the idea can not be accepted that foreign trade in automotive equipment has reached the low level that characterizes other lines. The export figures for October, which should be available shortly, are expected to show an unexpected volume of this business—sufficient to warrant a warning that no manufacturer can afford for one minute to let up on his cultivation of the foreign markets. The trade volume is high in those countries having the better exchange situation.

When it is considered that the Argentine, for instance, or China is nearly a month distant from the United States, with another month required for completing any transactions except by cable, it becomes apparent that manufacturers are not working now for to-day, but for two, three, four and even six months in the future. Therein does the foreign market differ from the domestic. What will be the exchange conditions in China and Brazil six weeks, ten weeks from now—that is what the automotive exporter must bear in mind in considering his sales policies, his advertising, his service and his business of the foreign field.

Thus, we work back to the exchange movement. Compare the currency values of to-day with what they were one week ago and two weeks ago. Then determine whether or not you can afford to let up on foreign trade which has been for many weeks the only bulwark of many companies from an actual and total cessation of business.

Sound Reasoning Required in Engineering Advertisements

IN writing advertising copy applying to engineering products, it is not a bad plan to introduce some technical reasoning, but it is most important that this reasoning be logical; for advertisements of this character are intended to appeal chiefly to the technical man, and if the reasoning will not stand the test of a rigid analysis the effect on the reader is likely to be of a negative character.

In a recent advertisement, the shifting of the center of load on a truck axle when the truck is on a side slope is discussed and illustrated. A plumb line is dropped from the top of the load centrally at the rear, and strikes the ground at the middle of the right hand rear tires. The intersection of the plumb line with the rear axle is marked, and it is intimated that the center of load on the axle is shifted from the center of the axle to the point thus marked.

The error in the illustration is that the plumb line should pass through the center of gravity of the whole load on the axle, instead of being held centrally at the top of the load. This latter method gives a greatly exaggerated impression of the shifting of the load with slight side slopes, especially if the useful load consists of light material and is very high. The center of gravity of the load on the axle is located even below mid-height of the useful load, because the springs, frame and body are below the useful load or payload and have considerable weight.

Durant Sells General Motors Stock

Morgans-duPonts Now Hold Control

Two Great Houses Prove Faith in Industry—Durant Will Not Retire

NEW YORK, Nov. 23—Control of the General Motors Corp., next to United States Steel, the most colossal industrial enterprise in America, has been acquired by the duPonts and J. P. Morgan & Co. Their ownership of more than 50 per cent of the "billion dollar a year" company was accomplished by purchase of the speculative holdings of W. C. Durant. This does not mean, however, that he will retire as a dominating figure in the industry for he undoubtedly will become chairman of the board of General Motors.

The organization of General Motors closely resembles that of the United States Steel Corp., also under the domination of the Morgan interests, and it is accepted as certain that the position which will be occupied by Durant in future will be analogous with that of Elbert H. Gary in his gigantic combination. Speculation in the industry centers around who will succeed Durant as president but no announcement has been made covering this point. There is little doubt, however, that it will be a production man who will have supervision over the operation of the 59 or 60 units in the organization. That will leave Durant free to devote to finances his genius in that direction.

No general shake-up in the general organization or in the various divisions is expected. Numerous changes in the general management of individual units have been made of late and the tendency has been to place in executive positions younger men who have ability backed by the energy of comparative youth.

No further expansion is looked for in the near future although the abundance of capital now back of the corporation would make it possible to take over well-established concerns which may be in temporary financial difficulties if it were deemed advisable. The possibilities before the powerful group which controls the greatest combination in the automotive industry are limitless.

Most of the reports which came into being almost simultaneously with the passing of control are without foundation, however, and are on a par with the outpourings of the rumor foundry for the past few months. The persistent report

LIST OF GENERAL MOTORS UNITS COVERS EVERY PHASE OF INDUSTRY

Many men in the automotive industry who consider themselves thoroughly familiar with all its ramifications would find it difficult to draw a diagram of the General Motors Corp. Its magnitude is better visualized with a list of its scores of units. Here they are:

PASSENGER CARS AND TRUCKS

GENERAL MOTORS GROUP:

Buick Motor Div., Flint.
Cadillac Motor Car Div., Detroit.
General Motors Truck Div., Pontiac.
Oakland Motor Car Div., Pontiac.
Olds Motor Works Div., Lansing.
Scripps-Booth Corp., Detroit.
Sheridan Motor Car Co., Muncie.

CHEVROLET GROUP:

Chevrolet Motor Co. of Mich., Flint.
Chevrolet Motor Co. of N. Y., Tarrytown.
Chevrolet Motor Co. of St. Louis, St. Louis.
Chevrolet Motor Co. of Texas, Ft. Worth.
Toledo Chevrolet Motor Co., Toledo.
Chevrolet Motor Co. of Bay City, Bay City.
Chevrolet Motor Co. of Kansas City, Kansas City.
Chevrolet Motor Co. of Atlanta, Atlanta.
Chevrolet Motor Co. of Minn., Minnesota.
Chevrolet Motor Co. of Cal., California.

GENERAL MOTORS OF CANADA, LTD.:

Canadian Products, Ltd., Div., Walkerville.
Chevrolet Motor Co. of Canada Div., Oshawa.
McLaughlin Motor Car Div., Oshawa.
Olds Motor Works of Canada Div., Oshawa.

TRACTORS AND IMPLEMENTS:

Samson Tractor Div., Janesville.
Samson Tractor Co. of Cal., Stockton.

ACCESSORIES

UNITED MOTORS GROUP:

Buffalo Metal Goods Co., Buffalo.
Dayton Eng. Laboratories Co., Dayton.
Harrison Radiator Corp., Lockport.
Hyatt Roller Bearing Div., Newark.
Jaxon Steel Products Div., Jackson.
Klaxon Co., Newark.
Lancaster Steel Products Corp., Lancaster.
New Departure Mfg. Co., Bristol.
Remy Electric Div., Anderson.

MISCELLANEOUS

Champlon Ignition Co., Flint.
Dayton-Wright Co., Dayton.
Delco-Light Co., Dayton.
Frigidaire Corp., Detroit.
General Motors (Europe), Ltd., London.
General Motors Export Co., New York.
Sunnyhome Electric Co., Detroit.
United Motors Service, Inc.

CENTRAL PRODUCTS DIVISION:

Central Axle Div., Detroit.
Central Forge Div., Detroit.
Central Gear Div., Detroit.
Northway Motor & Mfg. Div., Detroit.

MUNCIE PRODUCTS DIVISION:

Muncie Parts Div., Muncie.
T. W. Warner Plant, Muncie.

SAGINAW PRODUCTS DIVISION:

Central Foundry Div., Saginaw.
Central Motor Div., Saginaw.
Jackson-Church-Wilcox Div., Saginaw.
Saginaw Malleable Iron Co., Saginaw.

GENERAL:

Michigan Crank Shaft Div., Lansing.
St. Louis Mfg. Corp., St. Louis.
Dayton Metal Products Co., Dayton.
Domestic Engineering Co., Dayton.
Doylestown Agricultural Co., Doylestown.
Fisher Body Corp., Detroit.
General Motors Acceptance Corp., New York.
Industrial Terminal Corp., Detroit.
Janesville Machine Co., Janesville.
Lancaster Steel Products Corp., Lancaster.
Bearings Service Co., Detroit.
Brown-Lipe-Chapin Co., Syracuse.
Doehler Die Casting Co., Brooklyn.
Durant Building Corp., Detroit.
Flint Varnish & Color Wks., Flint, Mich.
Independent Lamp & Wire Co., Weehawken.
Consumers Power Co., Durant Hotel Co.,
House Financing Corp., Hyatt, Ltd., Lansing.
Home Building Co., Modern Housing Corp., Novelty Incandescent Lamp Co., Wisconsin.
River Power Co.

recently that the John N. Willys interests were to be acquired by General Motors were denied at the time by duPont, Willys and the Morgans.

This story is now more persistent than before. It is closely allied with another that Willys is to take over the Maxwell-Chalmers organization. This is characterized as "bunk" by a banker who is a director not only of the Maxwell company but of many of those in the Willys group. Another angle of this report is that Walter P. Chrysler, now executive vice-president for Willys and formerly a vice-president of General Motors, will return to the latter organization, but this also is denied. In the last published list of holders of more than 5000 shares of General Motors stock, Chrysler was

credited with having 8772 shares. On the present basis of 10 to 1, this would be equivalent to 87,720 shares.

The acquisition of control of General Motors by the Morgans and the duPonts was not entirely unexpected to those who had followed the affairs of the company closely. The duPonts have been the largest individual stockholders since 1918 but their alliance with the house of Morgan began only last June.

As a matter of fact it is generally admitted that the two great groups of financiers were active rivals on the market last February in the purchase of General Motors securities and that their operations were responsible for the wide fluctuations in market values of the stock.

(Continued on page 1095)

Truck Managers Discuss Problems

Greater Co-operation with Dealer Urged

Selection of Responsible Distributors Important — Judicious Advertising and Selling Urged

DETROIT, Nov. 19—Secretary of Agriculture B. T. Meredith urged concerted action by motor truck manufacturers in promoting the agricultural industry as the very foundation of their business in an address before the convention of the National Association of Truck Sales Managers here. Two hundred members of the association and guests attended the banquet. Secretary Meredith and W. R. Wilson, vice-president of the Irving National Bank, New York, who spoke of the relations between the truck dealer, manufacturer and banker, were the principal speakers. Mr. Wilson gave the sales managers good points in promoting banking relations.

The banquet followed two interesting sessions of the association, the first being devoted to business matters and election of officers for the ensuing year. H. T. Boulden of the Selden Truck Corp., was elected president to succeed J. E. Tracy; E. T. Herbig of the Service Motor Truck Co., vice-president, and A. E. Shafer of Gramm-Bernstein, secretary-treasurer. Directors for one year were elected as follows: A. C. Burch, Clydesdale; W. K. Ackerman, Louis-Hall; E. D. Hand, J. C. Wilson Truck Co.; two years, Mr. Herbig, Mr. Shafer and Homer Hilton of Oshkosh; three years, Mr. Tracy, Mr. Boulden and W. A. Clare of Atterbury.

Mooch and Howson Make Speeches

The afternoon session was devoted to addresses by Harry Mooch, manager of the N. A. D. A., and E. T. Howson, engineering editor of *Railway Age*. Mooch, using charts, dwelt chiefly on the organization and functions of the dealers' association and the necessity for co-operation and a get-together spirit among all sections of the automotive industry.

Howson gave the sales managers some good points in connection with the efforts of co-operation between the motor truck and the railway, and urged less attempt at competition and a stronger effort to make the railway an ally and a consumer rather than a competitor.

One of the most important features of the business meeting was the determination to develop a plan of closer co-operation between dealers and manufacturers. Following lengthy discussion, the president was empowered to name a committee of four to devise ways and

means for developing a plan of meeting with dealers at intervals for an interchange of ideas between the manufacturing and selling ends.

Wilson declared factory functions were divided into four cylinders, as he termed it, manufacturing, selling, accounting and finance. The sales department, he said, not only must sell the product but sell the institution as well. He urged co-ordination of effort and close co-operation between the manufacturing and selling ends as the chief requisite for success.

Readjustment Time for Study

"This period of readjustment," Wilson said, "while harassing, is in reality a time for preparation and a splendid opportunity for examination into company affairs. If you have been blinded by the glare of prosperity, this is the time for you to begin to take stock of yourselves and prepare for the resumption that is bound to come, that you may be personally fitted to conduct your affairs on a strictly sound business basis."

"This is your opportunity to synchronize your sales and manufacturing, and unless the two stick close together, you cannot adequately meet the flood tide or the ebb tide. This slump should furnish you valuable experience with regard to your inventories and the necessity for keeping them more evenly balanced. It gives you a time for adjusting your inventories and a time for sober reflection that must show you the absolute necessity of close relationship of all departments for the successful conduct of your business."

Referring to the retail selling end and the sales managers' trouble in that direction, Wilson said, the passenger car with several years lead had been able to grab the cream among distributors, and in those who were left for the truck manufacturer many have been wanting. He declared that many truck dealers were not qualified financially, while the moral qualifications of many others were away under par. He urged improvement of selling organizations and selling and advertising methods.

Must Get Advertising Results

Advertising methods, he said, necessarily reflect the quality of the advertiser's business and declared that millions of dollars had been wasted in the wrong kind of advertising.

"No one will be so narrow minded as to think of stopping advertising," said Wilson, "but it must be judicious advertising. You truck men have been highly favored in the propaganda that has been spread since the beginning of the war in behalf of the motor truck as an aid to transportation. The general publicity going out telling of the help of the truck

(Continued on page 1094)

Houston Opposes Change in Taxation

Treasury Can't Finance Private Business, He Declares—Must Pay on Profits

WASHINGTON, Nov. 22—Requests made to the Treasury Department by manufacturers that the time for payment of the income taxes due Dec. 15 be extended and that the "net loss" provision of the Revenue Act of 1918 be applied to the year 1920 are vigorously opposed by Secretary Houston. The agitation in this direction was undertaken on behalf of groups of manufacturers by Daniel Roper, former Commissioner of Internal Revenue.

"The agitation for these changes can only do harm," Secretary Houston asserted. "To extend the time for the payment of the Dec. 15 installment would simply mean that the Treasury would in effect be financing private business, which should provide for itself through ordinary banking channels, if necessary. In this respect the proposal is not different from those insistently made to the Treasury during the last few months, that Government funds be made available in various sections of the country to finance the holding of commodities or the export of goods to Europe."

"The suggestion that the 'net loss' provisions of the Revenue Act of 1918 be extended to the year 1920 is equally impossible from the point of view of the Treasury. Under the present revenue law the Treasury receives in the year 1920 taxes based on the income and profits of taxpayers during the year 1919. The whole financial program of the Government requires that the Treasury rely upon the collection of these taxes."

Must Make Certain of Receipts

"No change should be entertained which would render uncertain the bulk of the Government's tax receipts and perhaps result in heavy claims for refunds with consequent increases in the public debt and additional short-term financing. There is, furthermore, no reason in fairness why taxpayers who made profits in 1919 and became liable to pay taxes on the basis of these profits should now be permitted to throw upon the Government the burden of losses incurred in the conduct of their own businesses in the year 1920."

"The Treasury must of necessity promptly meet the Government's bills. If uncertainty is to be introduced now into the tax payments upon which the Treasury principally relies, it clearly will be impossible for the Government to finance itself."

Tire Dumping Check Sought in England

Heavy Shipments from America Asserted Flooding Markets and Breeding Unemployment

WASHINGTON, Nov. 19.—Diplomatic and trade observers here have manifested unusual interest in the efforts of British industrial concerns to shut off the volume of exports from this country, particularly motor tires. The British government, it is said, have made it clear to the industries and labor organizations that a new measure is intended to restrict so-called "dumping" of American tires on British markets.

The subject has claimed the attention of Parliament for some time. A joint deputation of employees and employers waited on the President of the Board of Trade in London recently with the demand that legislation be enacted to check the sales of American tires. The claim is advanced that the heavy shipments from American manufacturers flood the markets, and, as a consequence, the demand for home products falls off. Labor officials say that thousands of rubber workers are unemployed because of American competition.

In the discussions with Government officials British tire makers and employees cited import statistics to show that 90,000 tires entered England during September, principally from the United States. It is contended that the stagnant condition of the tire market in this country allows American manufacturers to ship their products to foreign markets at lower prices. It is further charged that the British tire industry would soon be destroyed if the importation maintained the present volume. These conclusions were reached by an estimate of 210,000 motor vehicles for the consumption of tires and a life of 5000 miles for each tire.

It is understood here that the pressure of employers and employees will be sufficient to force a restrictive measure through Parliament. The argument which is often used effectively in this respect has reference to the fact that unemployment pay is now a charge upon the State.

France Joins England in New Oil Combine

LONDON, Nov. 5 (*Special Correspondence*)—According to the American Chamber of Commerce in London, the formation of the new Anglo-French combine between the Anglo-Persian Oil Co., and a French group with a capital of 4 millions sterling for the importation into France of crude and refined oils, and for the refining and distribution of petrol is looked upon as being a necessary corollary to the San Remo agreement between Britain and France regarding the allocation of the Mesopotamian oil.

By the new agreement the Anglo-Persian Oil Co. will obtain a new market for their oil and British industry is expected to benefit by the manufacture of the necessary refining plant. Oil tankers are already being built in British yards in connection with the scheme.

The formation of the combine is said to be the reply to American activity which has been taking place in France, where the Standard Oil Co. has already a subsidiary undertaking. In addition, a Franco-American Oil Co. has recently been formed for the purpose of constructing oil tanks and pipe lines.

The American Chamber in London adds that the British Government is a large holder of the Anglo-Persian oil shares, and in 1914 subscribed at par for two million ordinary £1 shares, 1000 preference shares of £1 and £199,000 debenture stock, by which subscriptions they secured the controlling interest in the company. Last year when the capital was increased the British Government was declared to have subscribed for their proportion.

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Rubber Association to Gather Statistics

NEW YORK, Nov. 22.—The Rubber Association of America has undertaken the gathering of monthly statistics from individual tire manufacturers who are members of the Tire Manufacturers' Division, relative to inventories, production and shipments of pneumatic and solid tires and inner tubes, as well as the amount of cotton fabric and crude rubber consumed. The association will supply each member participating in the arrangement with the totals compiled from the individual returns. A report of total inventories, production and shipments as of Nov. 30 probably will be available early in December.

The regular annual meeting of the association will be held at the Waldorf-Astoria in this city, Monday, Jan. 10. The 21st annual dinner will be served the evening of that day. The next meeting of the executive committee of the Tire Manufacturers' Division will be held Dec. 15.

SUPERIOR NEARS COMPLETION

BENTON HARBOR, MICH., Nov. 18.—The first unit of the new malleable iron foundry of the Superior Steel Castings Co., has been completed and machinery is being installed to permit the starting of operations Dec. 1. The buildings are of steel and concrete, the main bay being 132 x 360 ft. with two wings each 60 x 60, giving a total floor space of 54,720 sq. ft. One wing is to be used as a shipping room and the other as a core room. The plant is so constructed that the raw material moves straight through from the yard to the shipping room to be tagged for delivery. The plant covers three acres and is so constructed as to permit of its being enlarged to six times the present capacity. An addition to the power house and a huge air compressor also have been completed and a steel crane runway.

Goodyear Surplus Due to Car Drop

President Seiberling Tells Stockholders Heavy Inventories Followed Curtailment in Orders

AKRON, Nov. 23.—Formal statement to the stockholders of the Goodyear Tire & Rubber Co. common stock on the financial conditions of the company and the methods adopted by the company's officials to meet the present situation has been issued over the signature of F. A. Seiberling, president of the corporation.

The statement declares that it is inevitable that Goodyear should be affected by the recent business depression as for several years it has been supplying 50 per cent of all tires used on new cars, and in order to protect these large customers it was necessary to keep generous reserves of raw material on hand and on order.

When, within the last five months, automobile production has been reduced from the highest peak to a point below normal it was reflected in the orders and while prompt action was taken to curtail raw material supply it was impossible to prevent inventories from piling up, the statement asserts.

The main problem was to provide adequate finances to carry the inventories, which was met by arrangement with a group of banking interests for a temporary loan of \$25,000,000, it stated.

The increase in sales for the fiscal year ending Oct. 31, of approximately \$38,000,000 over the fiscal year ending Oct. 31, 1919, and the growing business on other commodities made by the company also is referred to as an indication as to the safety of the money invested in common stock.

President Seiberling's statement followed a statement issued by the company announcing that at a meeting of the directors Nov. 13 the decision was made to pass the regular quarterly dividend. The directors' statement is to the effect that the dividend is not forthcoming "in view of the present financial and business conditions and in order to conserve resources of the company."

MICHIGAN ROAD FUNDS AMPLE

DETROIT, Nov. 20.—Besides caring for the overhead in the State Highway Department, Commissioner F. F. Rogers said to-day the automobile revenues would be amply sufficient to pay the approximately \$2,000,000 State aid money for good roads in 1922 and the more than \$3,000,000 in 1923. The department now has under construction or contracted for, between 400 and 500 miles of Federal aid roads to cost \$6,000,000 and 600 miles of trunk line road to cost \$10,750,000, available under the good roads amendment. There also is a stretch of 400 miles of assessment district roads, the cost of which cannot be determined definitely because the counties in most instances are shouldering the burden on a cost basis.

Medium Car Place Given to America

**Vauxhall Official Says British
Competition in This Class
Not Serious**

BOSTON Nov. 20—No serious competition against America in the medium-priced motor car field in Great Britain will crop up for years yet in the opinion of A. J. Hancock, M. I. A. E. F. R. S. A., works manager for Vauxhall Motors, Ltd., of Luton and London, who is touring America to observe industrial conditions and who is now in Boston.

England is taking care of its own demand for low-priced motor cars and also for the better grades of motor transportation. In the low-priced field, cycle cars and similar models are in favor and are turned out by home factories. In the production of high-cost machines England asks no odds of any other nation. In the field that lies between, notably the demand for cars that, in America, cost from \$1200 to \$2000, no widespread attempt is being made by English manufacturers to meet the need.

But in the opinion of Hancock, American motor car manufacturers have not paid sufficient attention to all the demands of their British market. With a few alterations, and a little finer detail of finish and appointment, such as could easily be applied, American medium-priced cars could be made more serious competitors than they now are. It is a matter of taste and the average Englishman is slow to change his ideas, but wants things as he likes them.

Hancock observed the volume of production in America and said: "There is every sign of material prosperity, but with the exception of motor cars, prices rule too high.

"I am not despondent over England's future as a result of my visit," declared the automobile engineer. "What I have seen simply means that the English must work just a shade harder in industry and that people of our operative class need to lend themselves to the arts of quantity production in a manner they are now disinclined to do.

England Must Watch Production

"It is a spectacle in this country to see able-bodied workmen doing repetition work so fast and with such apparent interest. They do it much faster than the English worker, who uses the same appliances. We must change this in England in order to hold our place against American competition in the markets of the rest of the world.

"American enterprise rides to a big gain or a big fall. American capitalists take bigger risks. For instance, in your business life the heads of a firm will say 'let's lay down a million more feet of floor space' as readily as English business would say 'let's lay down a thousand feet.' The expression on the face of the average American business man reflects the feverish activity of his brain.

"I am of the opinion that America has lost the sense of the ideal in its successful search for quantity production. The Englishman is more inclined to do the job for the job's sake, rather than for immediate profit in cash. He sets less store by the tangible things of life.

"As to the future of your automobile industry, I believe it is assured for those who produce as an engineering science. Many of the cheaper cars, rushed into production at the height of a feverish demand, I do not believe will survive.

Better Cars Lacking in Design

"Your better class of motor cars lack the simplicity of design and the taste in finish that is expressed in the English product. If we were to take over the manufacture of some of your best-known motor cars we would first simplify the design and do away with many parts. For instance, Vauxhall cars, at the present rate of exchange, are priced in the neighborhood of \$4,000. Compared with American cars in this price field they will do all your products will do, at less expense, with less complication—and are a perfectly turned-out job. Many American cars of the better class are too heavy—too extravagant in the use of fuel.

"I am perplexed over the fuel situation. In our country the high cost of petrol compels economy. Motor design of the future must turn toward more economical motors. If every motor car—every Ford car, even—was to reduce its fuel consumption 10 per cent the price of petrol would drop 50 per cent. I am of the belief that the automotive engineers will solve the problem and that a gasoline mileage of between 30 and 40 miles to the gallon is not improbable for the touring car of the future.

"Racing in England has done much toward the present development of the motor car, particularly in reducing its weight, and it will be continued. Vauxhall Motors, Ltd., is enlarging its plant by adding 45,000 feet of floor space. We plan to produce the finest machine that can be turned out, regardless of expense."

Hancock declares his company is planning no "invasion" of America with its product, but that it will produce its wares for those who want them.

Warehoused Cars Lead to Price Drop Belief

LOS ANGELES, Nov. 20—The used car situation here remains bad. It is the direct result of the recent price upset and at this time the dealers say they cannot approximate the time when improvement will be shown. Price uncertainty has made the trade-in a very skeptical value with the new car dealer and the exclusive used car dealer is finding troubles more numerous than ever.

The accumulation of new cars that are being put into storage is not helping the used car market a bit. A large percentage of the public holds to the belief that some day there will be applied a reduced price to these cars in warehouse and that will make owners of used cars have a better chance to trade for new cars.

Special Cables

French Plants Wait Pay for War Work

**Government Insistence That Pro-
fits Tax Be Paid First
Threatens Disaster**

(By Cable to AUTOMOTIVE INDUSTRIES)

PARIS, Nov. 22—Failure of the French Government to pay for war contracts and insistence at the same time by the Department of Finance that war profits taxes be settled, has resulted in many firms connected with the automotive industry being placed in a difficult position. Bleriot, employing 1300 hands in its airplane factory, found it impossible to get payment from the state and consequently closed its factory, declaring it had no funds in hand to pay the workers. This caused a protest by the men who threatened to take possession of the works and run them on a communist basis. After the plant had been closed four days the Government paid Bleriot 800,000 francs on account and operations were resumed. This incident caused a stir in the industry for Bleriot shut down at a time when there was plenty of work on hand.

It is quite possible automobile firms will follow the action of Bleriot if the State insists upon collecting war profits before paying for contracts completed two years ago. Although the Government owes Darracq 3,000,000 francs the Finance Department insists that war taxes must be paid at once. Darracq refuses to give way on this point.

It is reported Berliet has sold the steel rolling mills at his new Venissieux factory to a St. Etienne syndicate for 25,000,000 francs. These buildings have not been completed. Berliet will limit his activities to the construction of a new 16 hp. passenger car and a 1½-ton truck. Men are being taken on for automobile work.

Production at Lowest Point

Production in the French automotive industry is now at the lowest point ever recorded. De Dion has laid off 700 more men; Darracq has cut its staff 50 per cent; Tatil has laid off 320 out of 980; and Saurer has reduced 30 per cent.

French manufacturers now regret abandonment of the annual show and are starting an agitation for an exhibition in March or April. It is hardly likely to succeed, however, for no hall will be available at that time.

Rules for the French semi-Diesel engine competition have been withdrawn and will be revised.

Gasoline Production Reaches High Mark

September Figures Show Gain on
Output of 1919 But Reserves
Decline

WASHINGTON, Nov. 22—Comparative analysis of production and consumption of gasoline for the first nine months of 1918, 1919 and 1920 as compiled by the Bureau of Mines to-day shows evidence of improvement in the gasoline situation. Despite the heavy increases in domestic consumption and the export trade, the stocks on hand Sept. 30, 1920, were considerably larger than in the corresponding period in 1918 but less than last year. The refiners produced a daily average of 15,129,370 gal. of gasoline during September this year as against 11,318,419 gal. during the same period in 1919.

The refineries reported 288,195,394 gal. of gasoline on hand Sept. 30 as against 269,772,723 in 1918 and 371,125,419 in Sept., 1919. During the first nine months ended Sept. 30, 1920, domestic consumption of gasoline amounted to 3,211,275,983 gal., a noteworthy increase over the corresponding period last year when domestic consumption aggregated 2,574,541,261. These figures reflect the increased use of internal combustion engines. Exports showed a high percentage of increase as 465,439,992 gal. were shipped abroad since January as compared with 268,166,964 gal. for the nine months in 1919. The foreign trade for this year exceeded 1918, regarded as the banner year because of the use of automotive equipment incident to warfare. Shipments to insular possessions for the first nine months this year amounted to 16,312,386 gal. and 12,889,050 gal. of gasoline in the same period last year.

Consumption of lubricating oils since January amounted to 477,340,535 gal. as against 389,636,571 gal. last year. The total stocks of lubricating oil on hand Sept. 30 was 130,449,829 gal. This figure represents a sharp reduction in reserve, for in Sept., 1919, there were 158,967,070 gal. of lubricating oil in stocks. The fact that there has been but little increase in the daily average production for three years easily accounts for this slump.

Recommend Regrouping in Export Statistics

WASHINGTON, Nov. 19—Grouping of automotive products and machinery has been recommended by the Foreign Commerce Department of the Chamber of Commerce of the United States after a study of the Government's classification of import and export statistics. The reclassification, it is claimed, will permit greater accuracy and afford business men a more intimate knowledge of the nation's foreign trade. The National Chamber will recommend their adoption at the December session of Congress so

that the schedules may become effective at the beginning of the calendar year of 1921.

Exporters and others interested in foreign trade have complained of the inaccuracies of official statistics. It was found impossible to measure the volume of foreign trade under the caption "all other" which embraced many items.

Cut in Wages Denied When Overland Resumes

TOLEDO, Nov. 20—Vigorous denial that wages were cut at the Overland plant when 2000 men were taken back with the reopening of the parts department this week, was made by Vice-president Kilpatrick in charge of production. All of the men were taken back at their old wages he said. Kilpatrick added much was being done to the detriment of the industry by the circulation of such reports and he added that wage conditions in Toledo did not warrant a reduction of any sort when the men were taken back.

Resumption of operations in the parts department of the plant disposes of rumors—denied vigorously by Vice-president C. A. Earl—that the plant would be down indefinitely and other rumors involving abandonment of Overland 4 or substitution of the old model. Other departments of the plant will reopen as rapidly as inventories are completed, according to Kilpatrick and resumption in full is expected early in December.

October Employment Drops 22.5 Per Cent

WASHINGTON, Nov. 19—Statistics compiled by the Bureau of Labor Statistics concerning the volume of employment in October show a decrease of 22.5 per cent of the number on payrolls of 45 reporting establishments in the automobile industry as compared with the corresponding period last year.

The amount of pay roll also reflected a slump in manufacturing for it fell off 11.9 per cent, the aggregate of the reporting firms for a period of one week was \$4,559,967 for this year as against \$5,173,645 for the same period in 1919. The reporting concerns listed 160,413 employees in the week covered in 1919 while only 124,276 were employed in the same shops this year.

Only four industries showed increases in the number of persons employed, the largest growth being noted in the iron and steel business where the increase amounted to 57.3 per cent. Pay rolls increased in seven industries.

CONNECT NEW ORLEANS ROADS

SLIDELL, LA., Nov. 18—St. Tammany Parish, La., announces that it will issue \$100,000 in bonds to build an improved highway from Slidell to the Rigolets to connect with the new Chef Menteur road from New Orleans, and thus give a direct hard-surfaced road from the north into the Louisiana port.

Pierce-Arrow Drops "48" Chassis Model

Will Concentrate Passenger Car
Construction on One Model
in Future

BUFFALO, Nov. 20—Only one model of passenger car chassis will be produced by the Pierce-Arrow Motor Car Co. next year. Heretofore there have been two models, a "38" and a "48." The new model has the same cylinder dimensions as the "38," viz. 4 x 5½-in., and is of the six-cylinder type, but it has been redesigned in many details and will have no model designation.

The speed range of the engine has been greatly increased, extending now from 200 to 3000 r.p.m., and the maximum output is nearly the same as that of the old "48." All six cylinders are now cast in a block and the cylinder head casting is detachable. The T head cylinder with dual valves is continued, but a sheet metal cover is placed over the cylinder head to enclose the spark plugs, cable connections and other fittings on top of the engine.

The Delco dual ignition system adopted last year is continued. Spark plug cables are enclosed in a metal conduit of rectangular section. The starting and lighting system is now also of Delco make.

The carburetor is a Stromberg and is located on the left side of the engine, an air passage from the air heater on the other side of the engine passing between cylinders 3 and 4.

The control has been changed so that the spark and throttle levers are on top of the steering wheel instead of underneath. An accelerator of the roller type is fitted. The gearset is mounted amidships and has only three forward speeds instead of four. The clutch is of the multiple dry disk type. A tire pump is mounted on the gearset and is controlled from the driver's seat.

Brakes and Springs Changed

Band brakes are now used instead of shoe brakes. The springs are half-elliptic, the rear set being nearly 5 ft. long and underslung. It is believed that the changes in spring suspension will materially improve the riding qualities of the car. The wheels are of the wood artillery type, and are now fitted with Firestone demountable rims with quick detachable channels. The tire size is 35 x 5-in. all round on all models except those for 4-passengers or less, on which the size is 33 x 5-in.

The headlights are integral with the fenders. The enclosed cars carry the lamps on brackets, but either type may be had on all models. The headlights are fitted with small driving lights for city use, and also have non-glare lenses. All enclosed cars are fitted with a heater. The Alemite system of chassis lubrication is regular equipment.

Industry Organizes to Liven Business

Milwaukee Manufacturers and Dealers to Act Co-operatively in Meeting Problems

MILWAUKEE, Nov. 22.—The organization of the Milwaukee Automotive Manufacturers' Association, incorporated for the purpose of acting on conditions in the workshops of this industry locally, and steps taken by the Milwaukee Automotive Dealers Association to co-operate with H. J. Roesch, apprenticeship deputy of Wisconsin Industrial Conditions, are developing several features of a co-operative nature which, while dissimilar, are putting new life into the manufacturing and merchandising ends of the automotive business in Milwaukee.

During the past two years, owing to business pressure and conditions of an unusual nature, co-operative effort has been spasmodic, and the several component parts of the industry have been pretty well going their own way. This applies to groups as well as individuals. With business taking a new turn, with problems coming up that are not only inter-association but inter-industry in nature, vital steps are promised to be taken co-operatively this winter.

Steve F. Briggs of the Briggs-Stratton Co., president of the association, said: "The Milwaukee Automotive Manufacturers' Association was inspired by a feeling on the part of the manufacturers to have a group and secure representation in the Milwaukee Employers' Council. Its activities, as an organization, are touching upon all phases of the labor problem. There is no idea in this to build up a stone wall in front of labor, or anything of the kind, despite some reports from ill-informed persons. There will be an interchange of ideas and plans on welfare work, systematic hiring methods so that the better and proper man may be assured of proper consideration; this will avoid the loss to labor as well as employer from the mistakes of misfitting them into positions.

John P. Kelley, A. O. Smith Corp., is secretary-treasurer, and Walter Davidson of the Harley-Davidson Co., a director.

May Provide Apprentice System

R. C. Chidester, Packard Motor Car Co.; E. M. Jordan, West Side Buick Co., and H. W. Bonnell, Kissel Kar Co., as a committee of the dealers' association are now working out a schedule suggested by Roesch of the Wisconsin Industrial Commission for an apprenticeship system, for automotive mechanics. Service stations employing five or more hands will be included under a system of one apprentice for every five mechanics. There will be apprenticeship indentures, fixing the term of apprenticeship at four years, with constant educational work that will insure the apprentice a thorough training. Thus employers will be assured against depletion in the ranks of mechanics.

FUNDAMENTALS EXIST FOR STRONG INDUSTRY

ST. LOUIS, Nov. 22.—Evidence that the newspapers of the country are awake to the fact that temporary adversity can have no more lasting effect upon the automotive industry than it can upon steel or agriculture, is found in the following extract from an editorial published in the St. Louis *Globe Democrat*, one of the powerful papers of the United States:

"In the readjustments now in progress in the automotive industry there is no element of recession of the industry itself. The automobile is not going out of fashion or out of use. On the contrary, more people feel that they cannot get along without it than ever felt that way before, and more uses for it are being found. Especially is commercial use increasing, both of what has been called pleasure cars in the past and cars for transport purposes. The horse is rapidly going out as a motive power and automotive vehicles are also largely supplementing the railroads in the handling of freight. The great demand for new machines which followed the war was founded chiefly upon the unprecedentedly large incomes people were receiving and their unguarded expenditure of them, has slackened considerably, yet there is still a stronger demand for new vehicles than existed before the war, and this demand will continue. In addition to that, the number of vehicles has reached such a large total, variously estimated at 9,000,000 to 10,000,000, that the necessary replacements themselves constitute a larger demand than existed in total a few years ago. There will not be such an inducement for experimenters to take a flyer in automobile manufacturing as existed during the short period of unsatisfied demand, high prices and enormous profits, but the fundamentals of a sound and permanent industry of enormous production exist."

This is only one of many editorials now appearing.

A. B. C. REFRIGERATION CHANGES

CHICAGO, Nov. 19.—The Annheuser-Busch Sales Corp., St. Louis, has taken over the sales and manufacture of the A. B. C. transfer refrigerating system as applied to motor trucks and has opened a sales office in this city. The A. B. C. Refrigeration Co., Chicago, will continue the manufacture and sale of the system as applied to railways and steamships. Heretofore the truck bodies carrying the system have been built by different manufacturers. Through the change in handling there will be a centralization of this effort.

N. I. V. A. to Increase 1921 Demonstrations

Plans Sectional Events to Pro- mote Use—Seek Better Banking Attitude

CHICAGO, Nov. 20.—An increased number of tractor demonstrations will be held the coming year by the tractor manufacturing members of the National Implement and Vehicle Association. These will probably follow on sectional lines. There will be no show before the one to be held in Columbus in February of next year. The program for shows for the year 1921-22 will depend a great deal upon the success of the Columbus event.

The question of unified advertising was talked over and left in the hands of a committee for recommendation. The suggestion of a national advertising campaign to sell the idea of the value of the tractor to the public, the farmer and the country banker was made by F. P. Mount of the Advance-Rumely Thresher Co. Mount said that the banker was by no means sold on the tractor idea and that the present attitude of the banks in the country is that the farmer must finance himself as far as tractors are concerned.

The campaign, if started, would sell the big idea of the tractor rather than exploit the merits of different makes. Mount in the course of his remarks stated that he had sent out a questionnaire to representatives of his firm in the field to learn exactly the position of the bankers. The opinion of nineteen such representatives was solicited. On the question of whether or not there are many bankers who believe that tractors are more or less experiments fourteen reported that such was the case and five reported in the negative.

In answer to the question as to whether the banker believes that tractor development will show more profit to the farmer, four of the representatives reporting conditions in their district advised in the affirmative while fourteen reported adversely and one was in doubt. Of the nineteen representatives only four said that the bankers were sure that production would increase through the use of tractors.

Banker Not Sold on Tractor

From this gist of opinion it was apparent that the banker has not been sold on the idea and that there must be some plan adopted toward educating him. It was also shown at the meeting that the surface need of tractors had been obtained but that there are many farmers who will have to be gone after. There are many producers who can be made good prospects.

Before adjournment the following officers were chosen for the ensuing year: Chairman, F. P. Mount; vice-chairman, H. B. Dinneen, Moline Plow Co.; secretary and treasurer, E. C. Merwin, Russell & Co.

Way to Help Sales Shown to Engineers

Pennsylvania Section Gets Dealer Viewpoint on Efficiency in Pro- duction and Inspection

PHILADELPHIA, Nov. 17—The November meeting of the Pennsylvania section, Society of Automotive Engineers, held at the Engineers' clubhouse, 1317 Spruce Street, had as its feature an address by W. H. Metcalf, manager of the Philadelphia branch of the Wire Wheel Corp. of America, on "What the Automobile Engineer Can Do to Assist the Dealer and Owner." The speaker was highly complimented by the engineers for his practical talk covering as it did the selling viewpoint and engineering problems.

Metcalf called attention to the fact that automobile salesmen not only believe in, but like to boast about how efficient is the corps of engineers of their particular factory and usually make this a strong selling point. He mentioned the value to the salesmen of individuality in the car they are selling and showed that this individuality, consisting in some feature that the "other car" does not possess, is a source of pride alike to salesman and customer.

"Mr. Engineer," continued the speaker, "it is absolutely essential that you should insist upon proper factory inspection. For instance, all cotter pins should be placed where you have designated them to be and lock washers should be in place and not forgotten. This is one way you can help the dealer and owner.

"Another thing," said Metcalf, "the changing of the size of spindles, bearings and axles on a current model works a very great hardship on the dealer. This is in the case where it has been shown at the factory that the model has not stood up well under a smaller sized spindle and that for eastern hilly country it will require a heavier one. Then this is changed in the same model and when it arrives the dealer has no parts to replace the changed size.

Thorough Tests of Cars Needed

"In such cases," added the speaker, "the engineering department should have secured, through tests, the right size spindles, bearings, and axles before permitting the car to be sold. Why should a dealer be compelled to carry three or four different sets of parts for one model car?" He suggested that the way to obviate having to carry too many parts was to standardize them.

Taking up further the necessity for proper inspection, the speaker said that dealers have much trouble over improperly inspected vehicles arriving from the factory sometimes minus vital details, thus endangering life of owner and driver. As a specific case of neglect of inspection, he mentioned that fluted axles sometimes arrive having too much play in the hubs.

"Fluted axles should always be sweated into the hubs," declared Metcalf. "Otherwise pretty soon the axle will be revolving and wheel standing still."

"Engineers," he said, "should strive to reduce the parts on cars, in place of increasing them. This will make it easier for both dealer and customer." He accentuated the need for engineers providing for the factor of safety in motor trucks and asserted that the weight of chassis and body must be reduced, otherwise the state highway officers would see to it that more restrictive legislation would be passed. "When it comes to engineers," said the speaker, "the U. S. A. far outdistances other countries, but our manufacturers run at high speed and frequently do not allow our automobile engineers time to fully test their designs and improvements before placing them on the market. While the manufacturers on the other side of the water have been theorizing and testing out new designs, our manufacturers have built the cars and placed them out to the dealer who, unfortunately, has to test them."

Washington Section of S. A. E. Organized

WASHINGTON, Nov. 20—At a meeting in the Cosmos Club last night, local members of the Society of Automotive Engineers organized a Washington Section. The meeting was opened by C. H. Young, who introduced Coker F. Clarkson, secretary and general manager of the society. Clarkson sketched briefly the origin of the society and its development to its present position. Capt. St. Clair Street, Air Service, followed with a very interesting talk on his flight to Alaska and return.

After the talks the Washington Section was formally launched and Dr. H. C. Dickinson of the Bureau of Standards was unanimously elected as chairman. Col. F. H. Pope was elected vice-chairman, Archibald Black, secretary, and Conrad H. Young, treasurer. An informal session followed, when the chair threw the floor open to all present for discussion of the proposed section activities.

MILWAUKEE SHIPPING GROWS

MILWAUKEE, Nov. 18—Milwaukee has been designated as an important transfer point for lake-and-rail shipments of motor cars from Detroit to the West. Recently the Chicago and Detroit Steamship Co. added Milwaukee to its ports of call and now it has received instructions from Dodge Bros. to make Milwaukee the place of transfer to all points West, instead of Chicago. This will mean that the railroads out of Milwaukee will handle more than 400 cars weekly for shipment West. As navigation closes within a few weeks, the volume this year will not be large, but the Dodge Bros. contract will be effective throughout 1921 and indefinitely thereafter.

Space Goes Quickly for Transport Show

Twenty Truck Makers Take All but 1000 Feet at New York Exhibit

NEW YORK, Nov. 19—Approximately 22,000 feet of the 23,000 feet available for motor truck exhibits at the Highway Transportation Show to be held in this city, Jan. 3 to 8, was drawn for this week at the offices of the Motor Truck Association of America, under whose auspices the show will be held.

The representatives of twenty prominent makes of trucks were at the drawing which was made by lot, those contracting for the greatest amount of space having the first choice. Those who drew first were A. M. Welch, representing Reo; P. N. Lineberger, representing Rainier, and E. A. Travis, representing the Riker and Kelly-Springfield.

Although many other makes of trucks will be exhibited, space for only those makes whose representatives had contracted and paid for exhibition space were allowed to participate in the drawing. The makes of trucks included in the drawing were as follows: Atterbury, Bessemer, Brockway, Clinton, Federal, Grammm-Bernstein, Indiana, Transport, Vim, Ward-La France and Highway Trailer.

The show at which the above makes of trucks will be exhibited will be more in the nature of a Highway Transportation show than a mere motor truck show. For the first time in the history of motor truck exhibitions the show will be held by a users' organization instead of a dealers' or manufacturers' association; though the details of the show itself will be supervised by a committee of the Dealers' Division of the Motor Truck Association. The personnel of the show committee includes A. M. Welch, Reo, Chairman; J. A. Inness, Brockway; W. H. Moore, Garford; Paul Campbell, Indiana; R. S. Locke, Federal; W. Lawson, Nash, and E. A. Travis, Locomobile.

SUPPLY COMPANY MAKES PARTS

SPARTANBURG, S. C., Nov. 18—Greenwood, S. C., is to have a plant fully equipped to manufacture automobile parts in the near future, according to a statement by E. M. White, manager of the Southern Automobile Supply Co. Petition for an increase of the capital stock from \$50,000 to \$100,000 has been granted by the Secretary of State. As soon as the additional stock is subscribed the full equipment for the manufacture of parts will be installed. The concern will specialize in the making of unpatented parts, such as driveshafts, axles, bearings, etc. Apparatus for cutting gears will also be installed. White says his plan is not to sell more cars than he is now selling but to keep those already sold in good running condition by the manufacture of parts.

U. S. Chamber Sounds Railway Sentiment

Referendum Vote of Members Will Influence Stand on Bus Competition

WASHINGTON, Nov. 23—Incorporated in the ballot sent out by the Chamber of Commerce of the United States to-day to members for a referendum vote on proposals for improvement of street railway lines is a simple question which will sound out the opinion of the nation's leading business men as to motor vehicles as a competitor of the traction companies.

American business, as represented in the National Chamber will ballot on this recommendation of the Public Utilities committee, "Provision should be made against the consequences of unfair competition." It is significant to note that no direct mention is made of the automobile or motor bus. Yet the fact remains that the official report of the special commission appointed by President Wilson to inquire into the street railway problem stressed the importance of competition from these transportation agencies. Attention was called to the failure of the railways to overcome this competition particularly in sections where motor transportation had become firmly established. It was pointed out that the traction companies lost millions in fares. Complaint was made of inequities of taxation.

The committee recommended to the membership that "regulation should everywhere be instituted that will promptly follow changes in the situation of the companies rendering service of local transportation." As to regulatory measures, obviously involving the only effective competitors, automobiles, the committee recommended that it is a duty on the part of the public to protect the companies from unfair competition from any source.

Must Consider Developments

"This does not mean," the Chamber's Committee says, "that local transportation as it now exists should be perpetuated regardless of advances that may be achieved in the art of transportation or in the science of regulation. It does mean, however, that a company which is rendering service and which is developed in efficiency should not be subjected to competition from any other source which is not under corresponding regulation and obligations. The committee recommends that careful provision be made to prevent the disastrous consequences of unfair competition.

The question of fares charged by motor bus companies and other phases of competition are referred to only indirectly as follows:

"The whole purpose of regulation likewise implies that the companies subject to regulation should be responsible only for performing the service they have un-

dertaken. Their efficiency and the reasonableness of their rates of charge are the matters which should have undivided attention. Reasonableness in rates should be decided only with reference to the service that is rendered. In other words, the rates charged for street railway transportation should not be made an indirect method of taxation for the community."

The committee made no specific recommendation as to the Federal Commission's conclusion that traction companies should render service at cost. The returns of the referendum will not be compiled until early spring.

Champion Gets Verdict in Standish Action

OMAHA, Nov. 19—The Champion Spark Plug Co., Toledo, won its suit against the Myles Standish Co., Omaha, in the United States District Court here. Infringement of the Stranahan patents and imitation of the Champion X plug for Fords were alleged and the defendant was restrained on both points, with the amount of damages to be proved later by Champion. The trial consumed two weeks, before Judge Woodruff. Bonds on appeal were fixed at \$5,000 in the patent case and \$25,000 in the unfair competition suit. The court refused to forbid Champion to use the decision in its advertising.

The Court, in its opinion, pointed out that Champion has had a contract with the Ford Motor Co. since 1911; that Champion has sustained an estimated loss of \$500,000 since that time through selling its plugs to Ford; that \$500,000 has been spent in advertising by Champion; that this loss and this advertising have created a good-will for Champion which assured it replacement business from Ford owners; and that this good-will is a property which the Court should protect.

The unfair competition allegation was that Standish used on its cartons cuts which were deceptive and that the Standish plug was sold as "One-half inch Standard spark plug for Fords." The opinion stated that any imitation product must be so labeled and sold that the buyer clearly understands what he is buying, and that one manufacturer has not the right to trade upon the good-will or reputation of another unfairly.

FENDER ORDINANCE KILLED

CHICAGO, Nov. 18—The injunction obtained by truck owners against enforcement by the city authorities of the fender ordinance has been made permanent and perpetual by a decree entered in circuit court here. Under the ordinance all truck owners would have been compelled to equip their vehicles with fenders to prevent accidents to pedestrians. In contesting the ordinance truck owners showed that the fenders from which selection might be made were impractical and difficult to keep in working order.

Commission Decides for Bus Monopolies

Holds No Competition Rule Shall Govern Operation—See Business Growth

SPRINGFIELD, ILL., Nov. 20—Predicting that the advent of the hard-road system in Illinois will so greatly increase the number of motor bus transportation companies that it will raise them from one of the least to one of the most important places among the state's public utilities, T. E. Dempcy of the Public Utilities Commission announces that the commission has established a policy of no-competition which will go far toward simplifying the state's control of them.

This was exemplified by the commission's action in denying a certificate of necessity and convenience to the White Star Bus Co. to operate between West Frankfort and Frankfort Heights in Franklin County, a territory already traveled by the Southern Illinois Line.

The White Star company was ordered to withdraw its equipment and cease operation. The Southern Illinois company, it is announced had a monopoly on motor bus business in that country, and so long as it supplied sufficient and satisfactory service would continue to have a monopoly.

The commission's authority is beyond dispute. It was questioned by the commission itself two years ago, in refusing a certificate of convenience and necessity to a Peoria-Bartonville line.

The Supreme Court denied the commission's objection and held that as motor bus lines are nothing else but public utilities, the Public Utilities Commission must assume supervision.

Easier Bank Credits Help Milwaukee Trade

MILWAUKEE, Nov. 22—Although dealers in passenger cars are still obliged to contend with stiff sales resistance, an encouraging note is sounded in numerous quarters which indicates that things are loosening up and it is relatively less difficult to sell new cars than it was two to four weeks ago. One factor that is making this possible is that some of the smaller banks find their vaults filled to the brim with accumulated funds and are willing to accept good risks at a declining rate of interest. This is not a blanket proposition, but confined to instances so far more or less isolated. Eventually, it is believed the banks will find it necessary to go much further to turn over their funds profitably. While a month ago interest rates were up to 8 or 8½ per cent on commercial loans, with practically no funds available, instances have been reported in the past week where high class dealers have been able to get a reasonable accommodation at from 7 to 8 per cent.

Truck Sales Heads Discuss Problems

Time Sales Must Be Closely Scrutinized—Should Help Dealers with Bankers

(Continued from page 1087)

in solving the problems of the farmer, and the railway, as well as all industry, should be brought home to your banker when you go to him to talk credits."

Referring to time payment sales, Wilson said that it had been a stumbling block in the progress of the truck industry, and declared that any time sales now and forever should be scrutinized carefully. He said a lack of confidence in a dealer's ability as a credit man and a business man often prompted bankers to refuse credit, and he urged that nothing was more likely to aggravate such a situation than the time payment sale. In promoting a close relationship between the dealer and his banker, Wilson urged upon the sales managers that they help their dealer select his banker and at the same time help the local banker select their dealer.

Moock offered a suggestion which met with hearty favor, in which he urged motor vehicle chautauquas throughout the country to be addressed by specialists on banking, merchandising, highways and accounting. His plan is to divide the country into zones in such numbers that every dealer in the country will be able to attend one of the chautauquas and go to school for a week to listen to the advice and suggestions of these experts.

Howson in speaking of the railroad as a market for the motor truck, said the slump industry now was going through presaged improvement in the industry in that it will cause everyone to get down to intensive effort. There is a three-fold contact between the railroad and the motor truck, said Mr. Howson, first as shipper, as a competitor and as a customer. The car shortage, he said, had been wiped out and shippers now will get service.

Railroads to Meet Demands

He told of expansion plans of railroads which mean better conditions for the automotive industry, and said the railways were taking advantage of the slump that would enable them to handle freight traffic without congestion when freight begins again to move in normal quantity.

Ultimately, he said, the motor truck and the railway would supplement each other rather than compete. He said the railway by handling short haul traffic at a loss was making as great a mistake as the attempt of the motor truck to handle the long haul. He urged the truck for traffic up to 30 miles, the electric car up to 60, and the railway for the long haul. There are many ways the motor truck can be used efficiently in co-operation with the railways, he said.

An amendment to the by-laws with regard to the admission of new members, was adopted at the meeting Thursday morning. Under the terms of the amendment the clause requiring the applicant to be employed by a company which has manufactured and sold not less than 200 trucks within the preceding twelve months, was eliminated, and there is no requirement necessary now save that the applicant is employed by a producing company.

Ford Gets Concessions from Parts Factories

CLEVELAND, Nov. 20—Manufacturers in this city who have been making parts for the Ford Motor Co. are asking price concessions to enable that firm to meet its price reductions in cars without cutting labor costs. In a few instances the reductions have not been as great as desired by the Ford company, but as one Cleveland manufacturer said, a concerted effort is being made to bring prices in the motor field to a more reasonable level.

It was said that Ford demanded a reduction of 35 to 40 per cent in a part manufactured in Cleveland. Such a cut would obviously mean a cut in wages at the plant making the reduction. This particular manufacturer made a cut of 10 per cent without reducing labor. Another plant reports that it has reduced the unit price of a part for the Ford Motor Co. from 60 cents to 52 cents without reducing wages.

Nash Motors Closes to Adjust Inventory

MILWAUKEE, Nov. 23—Between two thousand and twenty-five hundred employees at the Nash Motors Co., Kenosha, were laid off Saturday, and notices were posted instructing the remaining employees that all would be laid off by Thanksgiving Day for at least two weeks pending inventory and readjustment.

W. H. Alford, vice-president, said as many as possible would be re-hired but that the force would be limited strictly to the demands of the business.

BOSCH REDUCES DEPARTMENT

SPRINGFIELD, MASS., Nov. 20—According to a statement of President Murray of the American Bosch Magneto Corp. yesterday, the number of working days will probably be further reduced in two or three departments; a three-day week to affect about one-fifth of the present force of employees. The schedule of the departments affected is to be reduced so that other departments may catch up in their schedule.

Despite the present dull conditions, the plant sees a prosperous year ahead and has enlarged its sales force to accommodate an enlarged output. Several promotions and shifts have been made in the branch sales offices. A. K. Chambers, formerly of the general sales department in this city, will become manager of the Chicago office.

Equipment Makers Decline Guarantees

Take Position at A. E. A. Convention That Jobbers Should Share Burden

CHICAGO, Nov. 20—The Automotive Equipment Association elected a manufacturer president, put jobber membership on a "wholesale only" basis and looked for means of holding up the sales curve at its annual convention and business exhibit here this week.

Attendance at the convention sessions ran between 600 and 700 and the great floor and annex of the Coliseum were thronged most of the week with jobbers and buyers inspecting the offerings of nearly 200 manufacturers, making the meeting and exhibit the greatest in the history of the industry.

Buying was light. The jobbers followed the lead of their customers in this respect and it was brought out in the meetings that the situation was forcing manufacturers into short purchasing of raw materials. Both manufacturers and jobbers saw in this a menace to adequate stocks when the spring demand becomes active and there was much discussion, with some promise of action, of more intensive selling expected to yield, at least by the first of the new year, a good volume of business.

The manufacturers' division refused to adopt the directors' suggestion that prices be guaranteed against decline. Though a few producers indicated that lower prices might be expected, the majority said this was impossible for some months to come. If a decline should materialize, they said, the jobber, who benefited by rising prices a year and two years ago, should share in the burden. Some manufacturers individually promised to consider the guarantee plan. The manufacturers also rejected the directors' suggestion that freight charges be absorbed or that price differentials be established for different territories. They felt that the jobber should do his own adjusting, a process which would be costly and cumbersome if handled at the factories. The manufacturers declined also to lengthen wholesale discounts.

Robert A. Stranahan, president of the Champion Spark Plug Co., was elected president, the first to serve from the ranks of the manufacturers, and Howard M. Dine of Dine-De Wees Co., Canton, Ohio, jobber, named vice-president.

The summer meeting will be held at Mackinac Island, Lake Michigan, July 4-9, and the 1921 convention and exhibit at the Coliseum, Chicago, Nov. 14-19.

STUDEBAKER CUTS FORCE

SOUTH BEND, IND., Nov. 22—The Studebaker Corp. has laid off 2000 of the employees in its plant here. The curtailment was attributed to temporary cessation of buying by the public. The plant has been running to capacity.

Morgans-duPonts Buy G. M. C. Control

Transaction Brings New Stability
to Financial Market—New
Capital Unlimited

(Continued from page 1086)

This contest was abandoned later and gave way to an alliance. The Morgans and the duPonts together will constitute one of the most powerful factors in the world of finance. The Morgans control unlimited capital while the duPonts are manufacturers and merchandisers besides possessing one of the finest engineering organizations in the United States.

The affiliation of the two powerful houses in the motor industry is hailed in business and financial circles as a powerful stabilizing factor. Its ramifications in this respect will extend far beyond the field of motors. Additional heavy investment in a line which has suffered seriously by reason of readjustment bespeaks supreme confidence not only in the future of automobiles but in that of the country as well. A steadying influence was exerted almost immediately in the stock market and almost the entire list rallied after a long continued slump which had occasioned serious alarm. It was hailed as a signal by powerful interests that the bottom had been reached and that it was time to buy.

There was a touch of the dramatic to the transaction which involved approximately \$50,000,000. Once begun the negotiations were carried through with almost startling speed. They were marked by a series of conferences which began last Thursday and continued almost uninterrupted day and night until late Monday. There came this laconic and unvarnished statement from the office of Durant:

"I have sold a substantial block of stock of the General Motors Corp. to the duPont Securities Corp. of Wilmington, Del., which has been formed by Pierre S. duPont and his associates and in the stock of which I will have a large interest."

Durant Still Holds 1,500,000

The sale involved about 3,000,000 of the 19,000,000 shares of General Motors stock outstanding. It leaves Durant and his friends with a large investment interest in the company estimated at as much as 1,500,000 shares. No definite statement has been made as to the amount of cash involved. The market value of the stock Monday was \$47,250,000 but Durant took a large part of his payment in the shares of the duPont Securities Corp.

An interesting chapter might be written about the duPont Securities Corp. itself. It was proposed in 1919 as a holding concern but the plan was abandoned and it was not until to-day that the company was incorporated at Wilmington with a capital of \$7,000,000 in preferred stock and 100,000 shares of common of no par value. The incorporators included Pierre duPont and J. J. Raskob, chairman

of the General Motors finance committee. Pierre duPont is now chairman of the General Motors board.

Former duPont investments in the corporation were held by the duPont American Industries Co., which was formed for that purpose. This included on Dec. 31 last, 238,504 shares of General Motors common and 159,111 shares of the common of Chevrolet Motors Co. of Delaware.

Stock Sold Low as 12%

The accumulation by Durant of the shares he has sold illustrated strikingly his confidence in the future of the great company he has done so much to build up. In the last few weeks the stock had sold down to 12% from 42, the year's high, on March 26. Durant went into the market to support the stock. He was convinced that much of the offerings were by interests which were selling short for speculative purposes and that most of this stock would not actually be delivered. His own confidence in the industry was not shared, however, by investors in all parts of the country who had bought when motors were rising to their heights of prosperity. These holders were shaken out and enormous quantities of stock were acquired for Durant by his brokers. The Morgans and duPonts were buying at the same time.

Some of Durant's purchasers were heavily margined and at a time like this it was a heavy burden to carry. It is reported unofficially that the price paid Durant averaged \$13 a share or \$130 a share in the old stock. It is not believed he suffered any serious loss at this price. Wall Street has it that the cash involved was around \$20,000,000. The transaction was underwritten by the Morgans and gives the duPonts approximately 38 per cent of the common stock outstanding.

Announcement was made in October that Durant had entered the investment banking field at the head of the Durant corporation to supplant the stockholders service division of General Motors. The new company was designed to distribute stocks on the part payment plan and specialized in General Motors common. It is now apparent this was to have helped Durant absorb the stock he was buying in the market.

Morgan Interests Not New

The interests of the Morgans in General Motors has been shorter lived than that of the duPonts but is said to have covered a considerably longer period than has elapsed since they actually became a factor in the company. It was announced last June that Morgan & Co. had acquired an interest in the corporation and had underwritten \$3,219,856 common shares of no par value of which 1,800,000 had been by British and Canadian interests and the balance, 1,419,856 shares, had been offered to common stockholders of General Motors at \$20 a share. If it can be assumed that the price paid in the present transactions averaged \$13 a share, the total involved was around \$20,000,000, less than it would have been at the offering price.

The 1,800,000 shares sold to foreign account was jointly acquired by Explo-

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Detroit Sees Gain for Entire Industry

Control of General Motors by
Powerful Interests Will Aid
All Motors

DETROIT, Nov. 24—Purchase of speculative holdings of W. C. Durant in General Motors by powerful financiers is regarded by automobile executives here as certain to have a most salutary effect on the industry. Entrance of the Morgan interests following the duPonts is expected to inspire confidence and is seen as an indication that financiers look upon the motor vehicle as vital to the country's welfare.

"It will solidify conditions in the world," said H. M. Jewett, president of the Paige-Detroit Motor Car Co., "and is bound to prove of great benefit to the industry. The action of big financial interests in getting behind General Motors will create a more substantial feeling and is just one more indorsement of our contention that the motor vehicle is an absolute essential in promoting progress."

Banks here were inclined to be reticent when asked for their opinion regarding the effect, though the attitude of local financiers is apparently summed up in the terse statement of Emory W. Clark, president of the First and Old National Bank, that taking hold of any industry by stronger financial interests necessarily increases confidence and attracts more favorable attention to that industry.

Neither Henry Ford nor any of his close associates, nor F. J. Haynes, general manager of Dodge Bros., would make a statement.

Ford to Pay Bonus Totaling \$10,000,000

DETROIT, Nov. 24—Bonus payments will be made to Ford employees this month in excess of \$10,000,000, it was declared by C. A. Brownell, publicity director, after a conference at the factory to-day. This is the company's answer to a statement emanating from Chicago which said the bonus would be eliminated.

It was declared further that Ford investment certificates, issued to employees last year, will carry an additional 3 per cent interest for the last six months of 1920, making a total of 14 per cent interest for the year. The factory is working on a five-day week basis and during the last two weeks production has ranged from 4000 to 4390 a day.

MICHELIN REDUCES PRICES

NEW YORK, Nov. 24—Reductions ranging from 7½ to 15 per cent have been made by the Michelin Tire Co., Milltown, N. J. Card casings have been cut 7½ per cent; fabrics and all Michelin ring-shaped tubes, 10 per cent, and all soft bead clincher fabric casings, 15 per cent.

Durant's Mastery Due to Optimism

One of First to See Future of
Motor Car—Buick Success
Led to Pinnacle

NEW YORK, Nov. 24—William C. Durant, whose sale of General Motors securities gave control of the world's greatest automotive corporation to the houses of duPont and Morgan, began his career with nerve, brains, imagination and a genius for financial organization. He and Henry Ford are regarded to-day as the master wizards of the industry.

Durant grasped the future of the motor car at a time when most men were laughing at it and the vision he had then built for him the position he holds to-day. He was not disturbed when others laughed at what they thought his foibles and follies and he has lived to laugh at them.

Born in Boston of revolutionary stock, Durant went to Flint, Mich., with his parents when he was 10 years old and there attended the common schools. His first job was in a grocery store but his first real job was with the Flint Waber Co. The company wasn't paying and its salaries were nothing to brag about but young Durant was keenly interested in its affairs and he finally was elected secretary and general manager.

After he put the water company on a paying basis he lost interest in it and began looking around for other decrepit companies he could put on their feet. He quickly acquired a reputation along this line. Then he thought he saw possibilities in road carts and became associated with J. D. Dort in the Dort-Durant Carriage Co. In the first year the company sold 100,000 and put Flint on the map.

While in the cart and carriage business, Durant became interested in automobiles. A man named Buick whom he knew had a gasoline engine designed for farm work. Durant looked it over, suggested improvements and the Buick automobile was born. The Buick business grew slowly but it grew and in 1907, while the country was in the midst of the panic, Durant announced that he was going to make 50,000 the next year.

Predicted 1,000,000 Cars a Year

When his friends tried to convince him he was insane, Durant told them that within ten years the country would produce and sell 1,000,000 cars a year. In spite of his friends he went ahead with his plans and built the great Buick plant at Flint. As soon as it was completed he set 13,000 men to work building automobiles.

With the Buick going full blast, Durant visualized the General Motors Co. of New Jersey, and it was incorporated nine years after the 1907 panic began. It included the Buick, Cadillac, Oakland, Olds, Northway and other companies. The Chevrolet Motor Co. was absorbed in May, 1918, and the United Motors Corp. was taken over the last day of the same

year. The great combination has expanded steadily ever since, almost continually acquiring ownership or control of additional companies. The Chevrolet became the closest rival of the Ford.

Durant was one of the first to see the possibilities of American cars in Europe and he believes the market there has scarcely been touched. His production energies of late have been bent upon the development of trucks, tractors, farm machinery and allied lines, for he is convinced the future in this field is as great as in passenger cars.

As an organizer Durant has few peers and his mastery of details is astounding. No man in his organization works harder than he notwithstanding the fortune he has amassed. His intimate knowledge of every detail of the automotive industry will make his continued services invaluable to General Motors and there is no doubt he will continue in its service.

Durant is an optimist and a constructionist. He saw readjustment coming and prepared his company for it so far as that was possible but the corporation will be equally ready to grasp the possibilities of the future.

Chevrolet to Start 100-a-Day Schedule

NEW YORK, Nov. 22—The Tarrytown plant of the Chevrolet Motor Co., which has been running for the past month with only about 200 of its 2000 employees at work, will begin the manufacture of 100 cars a day Dec. 1. It is understood that about 1000 men will be taken back at that time. The normal output of the factory is between 200 and 300 cars a day.

Virtually all the divisions of the General Motors Corp. now are operating on a reduced scale. This is particularly true in its passenger car lines. Cadillac was the last to go on short time and is now operating four days a week. Operations at the various Chevrolet assembly plants have been suspended almost entirely pending the sale of a substantial number completed cars on hand.

DIXIE RUBBER REORGANIZED

MEMPHIS, TENN., Nov. 22—A complete reorganization was effected at a meeting of the officers and stockholders of Dixie Rubber Co. held at Jackson, Miss., and the way was paved for settlement of the litigation now in court which was filed by a minority of the stockholders, asking that a receiver be appointed to replace President C. L. Cadenhead.

At the Jackson meeting Cadenhead and all the other officers and directors of the company resigned. A new board was elected, composed of residents of Mississippi and Arkansas except for one man from Memphis. The new president and general manager will be elected at a meeting to be held here on Dec. 17, at which some decision will be reached regarding the pending litigation. It is probable C. B. Box of Midnight, Miss., will be made president and that the suits against the company will be dismissed.

Big Creditors Fight Ericsson Bankruptcy

Will Propose Reorganization to
Lift Receivership—Assets
Exceed Claims

NEW YORK, Nov. 24—Merchandise creditors of the Ericsson Mfg. Co. of Buffalo, manufacturers of the Berling magneto and other automotive appliances, decided at a meeting here yesterday to make a determined stand against having the corporation declared bankrupt. They contend that it is solvent and that the interests of the unsecured creditors, whose claims aggregate \$365,000, would be sacrificed by bankruptcy proceedings.

The company was thrown into receivership a fortnight ago by the Swedish Ericsson Co., which is said to own a controlling interest in the Buffalo concern. William A. MacDougal and Robert E. Powers were named as receivers by Federal Judge Hazel. This action was followed by the filing of an involuntary bankruptcy petition by three Buffalo creditors whose claims aggregate \$3,000. The petition alleges the company committed acts of bankruptcy by making a general assignment of assets for the benefit of the City Trust branch of the Marine Trust Co. It is charged that the assets were transferred with "intent to hinder and delay creditors."

The larger merchandise creditors have formed a committee headed by W. M. Nones of the Norma Company as chairman and Sidney S. Meyers, general counsel of the Motor and Accessory Manufacturers Association, to protect their interests.

Nones and Meyers reported to the creditors that they had conferred with the receivers and had been refused co-operation in combatting the bankruptcy petition. The receivers asserted they would file no answer to the charges but a formal demand to do so will be served upon them. Meyers will appear before Judge Hazel on Dec. 2 when the order is returnable and make an aggressive fight against bankruptcy. In this connection he will propose a plan of reorganization under which it is believed the receivership eventually can be lifted and all the creditors paid in full as they are disposed to co-operate to the fullest extent. Creditors now are filing their claims with Meyers and this includes a large number who are not members of the M. A. M. A. The Irving National Bank of this city, a secured creditor, will co-operate informally.

Has \$1,000,000 in Orders

The claims against the company aggregate \$1,000,000, but the major part of them are secured. The nominal assets are \$1,500,000. The company has \$1,000,000 worth of orders on its books and few cancellations have been received.

The Marine Trust Co. of Buffalo is one of the largest creditors but its claim is secured.

Morgans-duPonts Buy G. M. C. Control

**British and Canadian Explosive
Makers on Board—Position
Now Impregnable**

(Continued from page 1095)

sive Trades, Ltd., of London and Canadian Explosives, Ltd., at \$20 a share. Sir Henry McGowan and Arthur Chamberlain of the British company, and William McMasters of the Canadian, were added to the directorate and the Morgans were given six representatives on the board.

The subscription privilege in the June financing required the payment of 10 per cent in cash and the remainder on Dec. 1. The payment due next week from the overseas purchasers will approximate \$34,000,000. No statement has been made as to the amount of the issue subscribed by former stockholders but assuming it is all taken up at the opening price, it would add another \$25,000,000 in round figures. It is expected that the powerful influences which now control the company will be able to force the market price up to a point high enough so that subscribers will complete their payments rather than forfeit the amount already paid. Receipt of this enormous amount of cash at this time will place General Motors in a position so impregnable that the present slump in the industry can be regarded with more or less indifference.

Of the 20,101,658 shares of common stock of no par value, issued or to be issued, 15,699,091 shares were offered for exchange on and after May 3, 1920, for outstanding common shares of \$100 par value on the basis of ten shares of no par value stock for each share of \$100 par value.

British Investors Brought in by Morgan

NEW YORK, Nov. 23—The Morgans and duPonts together were responsible for bringing British and Canadian investors into General Motors. The Morgans, with a house in London, always have been close to British capital and the duPonts were brought into contact during the war with Explosives, Ltd., of London, and Canadian Explosives, Ltd., which also were engaged in the manufacture of munitions.

At the close of the war the British companies, following the example of the duPonts in General Motors, decided to enter the field of transportation. The first step in this direction was to acquire substantial holdings in the Dunlop Rubber Co. of England, the leading tire concern of that country. They also entered the Canadian and British branches and then the American Dunlop Co., which will soon get into production in its \$15,000,000 factory at Buffalo.

Explosives, Ltd., also owns or controls Sunbeam bicycles and motorcycles, the

Rotax Motor Accessories Co., Kynock, Ltd., manufacturers of bicycles and motorcycles, and the British Pluvian Co., which makes artificial leather used in upholstering automobile bodies. Its investment in General Motors constitutes only about 2½ per cent of the total capital of the American corporation but it is sufficient to establish intimate relations between them.

Receiver Is Named for Hebb and Patriot

LINCOLN, NEB., Nov. 22—Federal Judge T. C. Munger has granted an order appointing Joseph E. Rosenfeld of Omaha receiver of the property of the Hebb Motors Co. and the Patriot Motors Co. The bond of Rosenfeld was fixed at \$50,000. The receiver was appointed on application of creditors.

The Patriot Motors company, successors to the Hebb Motors company, which has been operating a large truck factory at Havelock, had issued a call for a meeting of its creditors to be held at Chicago to-day to consider some plan to conserve its assets. This meeting has been called off since action was begun in court. The circular letter to creditors said: "We wish to present an accurate statement of our condition with a view of reaching some plan of meeting at least as nearly as possible all claims against the company. For this purpose we have called a meeting of creditors to be held at the Lasalle Hotel, Room 1811, in Chicago, on Nov. 22, 1920, at 10 o'clock, as a large percentage of our creditors are east of Chicago."

FRANKLIN STARTS RESEARCH

SYRACUSE, Nov. 24—Franklin Automobile Co. has inaugurated a commercial research department whose principal function will be to gather statistics on the market, forecast economic conditions, predetermine what sales performances should be in various territories and as a whole, and analyze sales performances of dealers to point out faults and suggest remedies. E. J. Buchaca will be in charge of the work and W. L. Wales will assist him.

NEW CASTLE TIRE TO RESUME

NEW CASTLE, PA., Nov. 19—Operations at the New Castle Tire & Rubber Co. probably will be resumed about Jan. 1, according to announcements of W. E. Duerstin, general manager. The plant has not been operating since Oct. 1. During the shut-down tire stocks have been completely cleared out. "We have been busy liquidating inventories and are now in a position to resume operations on a scale justified by new business that already is beginning to come in," said Duerstin.

PUSH GOOD WILL ADVERTISING

MEMPHIS, TENN., Nov. 22—In a series of page displays each week in local dailies, a message of importance is carried to the public dwelling on the reliability, permanence and scope of the motor car industry.

Lackawanna Steel Lays Off 1000 Men

Letting Up in Business Responsible—More Reduction to Come Is Statement

BUFFALO, Nov. 19—A material reduction of the working force of the Lackawanna Steel Co. at Lackawanna, which was started last Monday and continued throughout the week halted temporarily Saturday night with more than 1000 employees jobless. More reductions, it was said in Lackawanna last night, would be made during this week.

George F. Downs, president of the company, said last night that the working force had been cut down approximately 1000 during the week. He said that a letting up of business was responsible. He refused to confirm the rumor that more reductions would follow. Downs said that the former payroll of the company contained nearly 8000 names; that about 7000 still are at work. The coal shortage has not affected the Lackawanna plant nor hampered production, according to Downs. The gas furnaces, he also declared, were running to capacity and were unaffected by any shortage.

COURT NAMES RECEIVERS

NEW BRUNSWICK, N. J., Nov. 24—Custodian receivers in the Stanwood Rubber Co. of Elizabeth and Hardman Rubber Corp. of this city, have been appointed by Vice Chancellor Backes on application of George J. Culp of the Mutual Tire & Rubber Corp., and they must show cause by Dec. 30 why statutory receivers should not be appointed. The complaint sets Hardman liabilities at \$290,000, \$125,000 in excess of assets. Stanwood has outstanding \$300,000 of bonded indebtedness and \$197,000 in notes, all past due. The companies were arranging a merger and hope to complete it and reorganize before further proceedings are taken.

ALL AMERICAN TRUCK SOLVENT

CHICAGO, Nov. 22—The petition for the appointment of a receiver of the All-American Truck Co. was dismissed by Judge Carpenter in United States District Court here to-day. Local banking interests have furnished the company additional working capital, it was declared. It was also said that the company was solvent to the extent of \$568,000 above its liabilities.

B. F. TOBIN DIES

DETROIT, Nov. 23—B. F. Tobin, organizer and chairman of the board of directors of the Continental Motors Corp., died suddenly to-day from acute indigestion. Mr. Tobin was president of the company until last January. He organized the Continental in Chicago and later moved it to Muskegon, this State. He was widely known in automotive circles in this city.

METAL MARKETS

ELOQUENTLY expressive of the changed order of things in the steel market is the attention bestowed upon what fitful and slight demand emanates these days from the automotive industries. Even inquiries, frankly worded so as not to create in the recipients' minds false hopes of early orders, are loudly acclaimed as harbingers of an early return to activity. More profound students of the steel market, however, not only recognize that it would be childish to hope for a return of even a semblance of such conditions as prevailed in the steel market in the earlier part of 1920, but that an honest appraisal of the outlook for 1921 reveals that period as an off-year for the industry. Only the shallow-minded can read into Judge Gary's announcement that the Corporation's prices will remain unaltered, anything even remotely resembling a prop for a continuance of such premiums as the independents still quote over the Corporation's levels. It is an old established axiom in the steel business that the Corporation's price is the one level at which the independents can not sell. Their prices must be either higher or lower. They have been higher since March, 1919, because the demand exceeded the supply, and they are bound to be lower henceforth because the supply exceeds the demand. Several months may pass before this readjustment is completed, but once the slight residue of orders on independents' books has been disposed of, and there are indications of business that can be brought out by price pruning, the Corporation's prices are certain to become maximum quotations with the independents cutting under them as much as is necessary to land orders to keep their plants in operation. In the pig iron market neither the continuance of high coke prices nor the preference of certain large interests for a deadlock to concessions to buyers is saving values from crumbling.

Pig Iron—Following sales of basic at \$33, valley, the market for that grade may be nominally quoted at \$32@33. In Buffalo foundry has been resold at as low as \$33. Large selling interests aver that they will not countenance any cancellation of orders and, in some instances, they are shifting business from one furnace to another so as to expedite deliveries.

Steel—Since the placing of an order for 5,000 tons of sheets by a Detroit passenger car manufacturer with a Mahoning valley rolling mill, no fresh business of any consequence has been placed, although some tentative inquiries are reported to have been received by sheet makers. Automotive builders have ceased buying single-pickled and one-pass sheets which were resorted to as makeshifts, when they were unable to obtain satisfactory deliveries of full-finished material. Hot and cold rolled strip makers say they have sufficient orders left to operate at 75 per cent of capacity over the remainder of the year. Sheet mills are operating at about two-thirds capacity.

Aluminum—Sheets of German origin, but some of which are offered as Swiss, have been offered at as low as 35c. Small lots of spot virgin ingots, 98 to 99 per cent pure, have sold at 30c. The sole American producer maintains his previous contract price.

Copper—Resale metal, offered at as low as 14c., is hanging heavily over the market, which remains intensely weak.

Tin—Consumers show little interest in the market's daily fluctuations.

Lead—American Smelting & Refining Co. announced another cut of \$10 a ton in official lead prices, making the new level 6 cents New York and East St. Louis, with the outside market on a parity.

Zinc—Holders are looking for bids at 6½c., East St. Louis.

Brass—Although buyers concede that brass prices are more than reasonable, they show little disposition to place orders at this time.

Gas Tank Refiller Held for Contempt

INDIANAPOLIS, Nov. 22.—Orion K. Stuart, proprietor of the Sun Lite Gas Co. of this city was held in contempt of court by Judge Albert B. Anderson in Federal Court last week for violation of an injunction granted four years ago prohibiting Stuart from refilling Prest-O-Lite gas tanks without first enameling or plating the tanks in such a manner as to obliterate the name of the Prest-O-Lite Co. and permanently plating or stamping on the tank a notice that it had been refilled or recharged.

The defense set up was that Stuart thought he was complying with the terms of the injunction when he painted out the name of the Prest-O-Lite Co. and pasted on the tank a paper label stating that the tank had been refilled. However, Judge Anderson insisted that Stuart had not in good faith tried to obey the injunction. The question of a fine was taken under advisement, and the court stated that if Stuart persisted in violating the order he would be sent to jail.

At the hearing four years ago Stuart narrowly escaped a jail sentence for contempt when he asked Judge Anderson how much stock he held in the Prest-O-Lite Co.

R & V Makes New Four, Six Price Guaranteed

EAST MOLINE, ILL., Nov. 19.—The six cylinder R. & V. Knight line will be supplemented by a four-cylinder model which will be ready for distribution early next spring. The price of this new car will be \$2150, and it will be made in two body styles—a five-passenger touring and a five-passenger sedan. The same general lines of construction used in the six will be followed in this model. The engine will be a Knight with 3¾ in. bore and 5 in. stroke; the tires 32 x 4 in., and wheelbase 116 in.

The prices on all the six-cylinder models have been guaranteed to May 1. The present prices are \$3350 on all open cars, \$4000 on the coupé, and \$4200 on the seven-passenger sedan.

WEED TO MAKE BUMPER

NEW YORK, Nov. 22.—The American Chain Co., which manufactures Weed chains for automobiles and a wide variety of other types of chains, is about to manufacture a bumper. The bumper was shown for the first time at the exhibit of the Automotive Equipment Association in Chicago.

Bank Credits

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

NEW YORK, Nov. 24.—Commodity price recessions continue. At the week-end and particularly on Monday of this week, however, there was a significant recovery in security prices. This recovery and the lessened tension in the money market, as reflected in interest rates and bank reports, have stimulated confidence in some quarters that the peak of the credit strain has now been passed.

There was a noticeable easing of money rates in the New York market last week. The range of call rates was 6 to 9 per cent, as compared with 7 to 10 per cent the week before. On Monday of this week the rate after market hours declined to 4½ per cent from a closing rate of 5 per cent. This was the lowest rate recorded in about 13 months.

Time rates have also receded and the supply of money offered last week was more abundant. For 60 and 90 days on mixed collateral the rates on Monday of this week were 7½ per cent to 8 per cent, and for longer maturities 7½ per cent to 7¾ per cent—rates for all-industrial collateral being about ¼ per cent higher than for mixed collateral.

Loans of the New York Associated Banks declined last week \$15,242,000, and net demand deposits \$32,244,000, accompanied by a reduction of \$23,965,000 in aggregate reserves, the excess reserves amounting at the week-end to \$12,470,380.

The New York Federal Reserve Bank gained \$13,657,000 in reserves, while bills on hand declined \$52,188,000, the decline in rediscounts secured by commercial paper amounting to \$66,060,000. Meanwhile the bank retired \$23,250,000 of the \$38,000,000 rediscounted the previous week with other Federal Reserve Banks. Net deposits were lower by \$27,521,000, and Federal Reserve notes in circulation declined \$2,988,000.

There was a further improvement last week in the condition of the Federal Reserve Banks as a whole. Reserves remained practically unchanged, the gain for the week being only \$217,000. Bill holdings were reduced \$123,999,000, the chief feature of this reduction being the decline of \$89,306,000 in discounts on commercial paper. Net deposits declined \$42,024,000, and Federal Reserve note circulation \$21,550,000. Accordingly, the ratio of gold reserves to Federal Reserve notes in circulation, after setting aside 35 per cent against net deposits, increased from 47.9 per cent to 48.6 per cent.

BIDDER & SMART TO RESUME

AMESBURY, Nov. 19.—The Biddle & Smart Co., the largest manufacturers of automobile bodies in New England, whose plant has been shut down for the past month, will resume operations at once. About 1500 hands were employed in the busy season.

MEN OF THE INDUSTRY

E. E. Allyne, President of Aluminum Manufacturers, Inc., and of its subsidiary, the Aluminum Castings Co. of Cleveland, has resigned on account of ill health and plans to spend the winter in the South. W. P. King, formerly vice-president, has been elected president, to succeed Allyne. King will also be treasurer. George J. Stanley has been made vice-president in charge of production. John H. Watson, Jr., remains secretary.

C. E. Denzer, formerly manager of western sales for the White Co., with headquarters in Cleveland, will take charge of the new White branch to be opened at Denver. Denzer will have charge of sales and Thomas Parramore will be in charge of the service department. The Denver branch will be the distribution center for the greater part of the western territory.

C. R. Stowell has been made manager of the Bearings Service Co., Fresno, Cal., branch. He was formerly connected with the San Francisco branch. A. F. Ward, formerly assistant service manager of the Timken-Detroit Axle Co., has been made manager of the Omaha branch of the Bearings Service Co.

George W. Selberling has been made general manager of tire factories of the United States Rubber Co. and Erwin Meyer, chief consulting chemist. John J. Shea has been made factory manager of the Colt Plant, Revere Rubber Co., and A. P. Delahunt, chief accountant.

Bert Dingley, the former race driver, who has for sometime been head of the Marmon service maintenance department, has been taken over by the Marmon factory organization and placed in charge of all inspection from the point at which assembly begins.

James E. Ryan, treasurer and general manager of the International Purchasing & Engineering Co., Detroit, has left on a three months trip abroad upon which he will call on all European automobile manufacturers represented by the company in America.

D. M. Boyd has been elected secretary of the Traffic Motor Truck Corp. He was formerly secretary and treasurer of Boyd-Richardson, Inc. He succeeds H. P. Mammen, who continues as treasurer.

W. F. Donlin, for three years associated with the King Motor Car Co., has been made general sales manager of the Barley Motor Car Co. of Kalamazoo, manufacturers of Roamer cars.

William G. Toland has been appointed general truck sales manager of Hare's Motors, Inc. He was formerly truck sales manager for Packard in the New England and New Jersey territories.

George C. Murray, formerly connected with the Aluminum Castings Co., has left Detroit for San Francisco, where he will have charge of the sale of Fruehauf trailers on the Coast.

William Brown has been transferred from his position as supervisor of purchasing to become special representative of the sales department of the Marmon organization.

Leigh Smith, who has been in charge of the service department of the Fisher Body Co., has been made service manager of the Fleetman-Buick Co., of Wyandotte, Mich.

Claude S. Hyman, former advertising manager of the Standard Motor Truck Co., Detroit, has joined the Charles H. Fuller advertising agency, Chicago.

W. W. Wetzler has been made chief of the credit department of the Gerlinger Electric Steel Casting Co., West Allis, Wis.

North American Storage Battery Co., Indianapolis, which will begin the manufacture of starting and lighting batteries for automobiles and batteries for electric cars about Dec. 1, has leased 17,000 feet of floor space for ten years in the building at 40 West Pratt Street.

Republic Shows Gain
in June Balance Sheet

NEW YORK, Nov. 22—The balance sheet of the Republic Motor Truck Co. as of June 30, last, compares as follows with 1919:

Assets	1920	1919
Prop. acct., deprec. val.	\$2,009,651	\$2,146,748
Inv. in and adv. to affil. cos.	1,814,888	1,893,152
Def'd assets	281,788	303,854
Good will	4,805,936	4,805,936
Current Assets		
Notes and accts. receiv.	1,226,610	373,928
Inventories	6,781,561	5,301,479
Cash	1,162,965	1,268,823
U. S. Lib. bds.	8,714	120,975
Totals	\$18,092,113	\$16,214,895
Liabilities		
Pfd. stk.	\$854,000	\$904,000
Com. stk.	8,418,450	8,418,450
Pur. Mon. obl.	3,089,281	3,227,509
Rcs. for taxes and con-ting.	741,583	562,370
Surplus	2,719,034	1,242,143
Current Liabilities		
Notes and accts. payable	1,873,826	1,475,925
Accrd. liab.	284,970	291,040
Mis. cur. liab.	110,969	93,527
Totals	\$18,092,113	\$16,214,895

On June 30, 1920, the net assets applicable to the common stock amounted to \$6,203,448, or \$62 per shr. of no par value. This figure is after allowing for the redemption of preferred stock at \$115 per shr. and after deducting "goodwill" carried at \$4,805,936, or \$48 per shr.

Grant Issues Notes
to Carry Inventory

CLEVELAND, Nov. 22—The Grant Motor Car Corp. will offer to stockholders an issue of short time notes bearing 8 per cent interest and maturing on or before Nov. 21, 1921, according to an announcement that has been made at offices of the corporation in this city.

The notes are to be offered at 95 on a basis of \$20 a share for each share of preferred stock and \$2 of common stock now held. President Shaw says that when selling of motor cars stopped practically overnight the Grant Co. took steps to stop incoming materials, but before the plans formulated could be executed inventory increased in excess of \$500,000.

Based upon spring and early summer normal deliveries of cars this inventory could have been liquidated quickly, reads the letter. But with the almost complete stoppage of sales no such liquidation is possible. As a result the company now faces the necessity of financing a big and valuable inventory until the resumption of buying, which will rapidly provide funds for all requirements.

FINANCIAL NOTES

Fisher Body Corp. reports sales for the first quarter ending July 31, 1920, as \$22,627,000 compared with \$8,369,000 for the corresponding three months in 1919. In the second quarter sales were \$23,632,000 compared with \$12,831,000 in the previous year. Sales for the third quarter are expected to approximate 85 per cent of those in the second quarter.

Stewart-Warner Speedometer Corp. for the nine months ended Sept. 30 reports net profits after charges and Federal taxes, of \$1,791,426, equivalent to \$4.47 a share on the 400,000 shares of no par stock. With an allowance of \$1,200,000 for dividends the company has a surplus of \$591,426 for the nine months.

Lee Tire & Rubber Co. reports net sales for the nine months ended Sept. 30 as \$6,204,586, compared with \$4,492,189 in the same period of 1919, an increase of \$1,712,397. After all charges before tax deductions there was a net profit of \$640,684, which compares with \$460,512 in the 1919 period.

Chandler Motor Car Co. has declared a regular quarterly dividend of \$2.50 a share payable Jan. 3. President Chandler reported earnings for the past three months as largely in excess of dividend requirements. Current operations were reported satisfactory for this time of year.

Ajax Rubber Co., Inc., has declared a quarterly dividend of \$1 a share payable Dec. 15, placing the stock on a \$4 annual basis, compared with \$6 which had been paid since August, 1917. The reduction was made in view of business and financial conditions.

Walter Motor Truck Corp., New York, has increased its capital stock to \$1,000,000 to permit of increased production. The company is building a new plant at Poughkeepsie which will be in operation in January.

Farmers Tractor Corp., Stevens Point, Wis., has been incorporated with a capital stock of \$500,000 by A. J. Patch, William Mainland and A. N. Stevenson, all of Oshkosh, Wis.

Avery Co. notes at par to the extent of \$3,000,000 are being offered by bankers who took over the entire issue. The notes constitute the company's only funded debt.

SINGER FOUND BANKRUPT

NEW YORK, Nov. 22—The Singer Motor Co. of Mt. Vernon, which has been in receivership for some time, has been adjudged bankrupt and its assets will be sold at the plant Nov. 26. The bankruptcy petition followed vain efforts to settle the company's affairs. The plan which was proposed did not prove satisfactory but Max Lowenthal, the receiver, is continuing his investigation of the company's affairs.

AMERICAN BODY BUYS PLANT

PHILADELPHIA, Nov. 19—Title has been taken by the American Motor Body Corp., controlled by the American Can Co., from the Hale & Kilburn Corp. to the latter's factory at Eighteenth and Huntingdon streets, including five five-story factory buildings and thirteen one and two-story mills and shops. The transfer was subject to mortgage of \$2,000,000. Two lots at 2546 and 2548 North Eighteenth Street were included in the transaction.

Calendar

SHOWS

- Dec. 7-10—Cincinnati, Automobile Show in connection with Ohio Automotive Trade Ass'n Convention, auspices of Cincinnati Automotive Trade Ass'n, Music Hall, J. J. Behle, Mgr.
- Dec. 10-12—New York, Motor Boat Show, Grand Central Palace.
- Dec. 11-20—Los Angeles, Annual Automobile Show, Los Angeles Motor Car Dealers' Ass'n.
- Jan. 3-8—New York, Motor Truck Show, Motor Truck Ass'n of America, Twelfth Regiment Armory.
- Jan. 8-15—New York, National Passenger Car Show, Grand Central Palace, Auspices of N.A.C.C.
- Jan. 17-23—Milwaukee, Annual Automobile Show, Milwaukee Automotive Dealers' Ass'n.
- Jan. 22-27—San Francisco, Second Annual Pacific Coast Automotive Equipment Exposition, Auditorium.
- Jan. 22-29—Cleveland, Annual Passenger Car Show, Cleveland Mfr's & Dealers' Ass'n, Wigmore Coliseum.
- Jan. 22-29—Montreal, Annual Automobile Show, Montreal Automobile Trade Ass'n, Motordrome Bldg.
- Jan. 29-Feb. 4—Chicago, National Passenger Car Show, Coliseum, Auspices of N.A.C.C.
- Feb. 5-12—Minneapolis, Annual Automobile Show, Minneapolis Automotive Trade Ass'n.
- Feb. 6-12—Columbus, National Tractor Show, Columbus Tractor & Implement Club, Ohio State Fair Grounds.
- Feb. 12-19—Hartford, Conn., Annual Automobile Show, Hartford Automobile Dealers Ass'n, Armory, Arthur Fifoot, Mgr.
- Feb. 12-19—Kansas City, Annual Automobile Show, Kansas City Motor Car Dealers' Ass'n.
- Feb. 14-19—St. Louis, Annual Automobile Show, St. Louis Automobile Mfr's & Dealers' Ass'n, Robt. E. Lee, Mgr.
- Feb. 14-19—Winnipeg, Western Canada Automotive Equipment Show.
- Feb. 19-26—San Francisco, Fifth Annual Pacific Automobile Show, Exposition Auditorium, George Mahlgreen, Mgr.
- Feb. 21-26—Louisville, Annual Automobile Show, Louisville Automobile Dealers Ass'n, First Regiment Armory, C. L. Alderson, sec'y.

- Mar. 2-10—Des Moines, Annual Automobile Show, Coliseum, C. G. Van Vliet, Mgr.
- Mar. 5-12—Brooklyn, Annual Automobile Show, Brooklyn Motor Vehicle Dealers' Ass'n, 23d Regiment Armory, George C. Lewis, chairman.
- Mar. 7-12—Syracuse, N. Y., Annual Automobile Show, Syracuse Automobile Dealers Ass'n, Armory, Howard H. Smith, Mgr.
- Mar. 7-12—Indianapolis, Annual Automobile Show, Indianapolis Automotive Trade Ass'n, Automotive Bldg., State Fair Grounds, John Orman, Mgr.
- Mar. 12-19—Boston, Annual Automobile Show, Mechanics Bldg. and South Armory.
- Mar. 14-19—Omaha, Annual Automobile Show, Omaha Automobile Trade Ass'n, Inc., Omaha Auditorium, C. G. Powell, Mgr.
- April 4-8—Seattle, Annual Automobile Show, Seattle Motor Car Dealers' Ass'n, Arena Hippodrome.
- April—Chattanooga, Tenn., Spring Automobile Show, Chattanooga Automotive Trade Ass'n, Sunday Tabernacle, C. A. Noone, sec'y.
- FOREIGN SHOWS**
- Nov. 29-Dec. 4—London, Cycle and Motorcycle Show, Cycle and Motorcycle Mfr's and Traders Union, Ltd., Olympia.

- Jan. 7—Sydney, Australian Motor Show.
- Jan. 22-29—Colombo, Ceylon Motor Show.
- Feb. 7—Delhi, India, Delhi Motor Show.

CONVENTIONS

- Nov. 30-Dec. 3—St. Louis, Third Annual Meeting and Exhibition, Automobile Accessories Branch, National Hardware Ass'n.
- Dec. 7-10—New York, Annual meeting American Society of Mechanical Engineers, Engineering Societies Building.
- Dec. 8-9—Cincinnati, Annual Convention, Ohio Automobile Jobbers' Association.
- Dec. 13—Washington, Convention of American Association of State Highway Officials.
- Dec. 28-30—Chicago, Annual Meeting American Society of Agricultural Engineers.
- Jan. 7—New York, Advertising Managers Council, Motor & Accessory Manufacturers' Ass'n.
- Jan. 11-13—S. A. E. Annual Meeting, New York City.
- Feb. 2-4—Chicago, First Annual Meeting, Automotive Electric Service Assn. Hotel La Salle.
- Oct. 12-14, 1921—Chicago, Twenty-Eighth Annual Convention National Implement & Vehicle Ass'n.

Massachusetts Acts to Keep Roads Open

BOSTON, Nov. 19—A proposal that local master teamsters merge their forces with those of the city in the work of opening up traffic channels in any big snowstorms Winter may bring is made in a circular letter to such men sent out now by Mayor Peters. All boss teamsters are invited to a conference Dec. 1, to discuss the matter.

Brookline is all ready for anything in the line of snow. It has purchased a large snow-removing machine. At a meeting of the Essex County Associated Boards of Trade held last evening at the Merrimac Valley Country Club, Methuen, action was taken on the matter of snow removal and it was voted that a bill be prepared for the next legislature providing that State roads be kept open each Winter at the expense of the State. It was brought out at the meeting that the State this year can do no more than supply plows, funds for anything in addition being lacking, but with the passing of the proposed bill the roads would be kept open for automobile transportation the year around.

LICENSE MICHIGAN INSURANCE

GRAND RAPIDS, MICH., Nov. 18—The Michigan Automobile Insurance Co. has been licensed by the Michigan Insurance Department to write fire, theft, liability, property damage and collision insurance. It expects to begin operations soon and hopes to obtain permission to do business in Illinois, Ohio and Indiana.

The authorized capital is \$250,000, all but \$50,000 of which has been paid in. Herbert D. Webber is president of the company.

Farm Bureau to Hear Need for Good Roads

WASHINGTON, Nov. 22—The relationship between good roads and agriculture and the necessity for a constructive road building program as an adjunct to a national agricultural policy, will be discussed at the second annual convention of the American Farm Bureau Federation at Indianapolis, Dec. 6, 7, and 8. The speakers will include Governor W. P. G. Harding of the Federal Reserve Board, several state governors, highway, transportation and farm experts.

The importance of adequate means of transportation for marketing farm products and for bringing about closer communication between the producer and the consumer which will be of mutual benefit, will be taken up on the opening day of the convention and the entire afternoon session will be devoted to this discussion. T. H. McDonald, chief of the U. S. Bureau of Good Roads, will tell of the need of more and better highways and the necessity of making provision for them in a national agricultural program. He will also dwell on the advantages to the farmer offered by the motor truck for marketing products over short distances. H. G. Shirley, Secretary-treasurer of the Federal Highway Council, will present a national highway policy covering both construction and maintenance of highways.

Auxiliary Completes Round Trip to Europe

NEW YORK, Nov. 22—The most remarkable of all voyages ever made by a small boat was unquestionably that completed to-day when the 35-ft. water-line auxiliary ketch Typhoon arrived in New York Harbor after a round trip voyage across the Atlantic. Typhoon, owned and commanded by William Washburn Nutting, managing editor of *Motor Boat*, designed by William Atkin and built in the boat shops of the Alexander Graham Bell Laboratories, Baddeck, Nova Scotia, sailed from Baddeck on July 17 for Cowes, Isle of Wight, England, to report the races for the British International motor boat trophy. She made the trans-Atlantic passage from land to land in 15 days 9 hours.

The return voyage was made via the Bay of Biscay and the Azores. Typhoon left Ponta del Gada, Azores, Oct. 17, and encountered the severe gales which caused several ocean liners to send out distress signals, Nov. 17. She was then about 500 miles off the coast. At one time the crew, which on the return voyage consisted of Mr. Nutting, James Dorsett and Uffa Fox, believed the little vessel to be lost. The Navy Department had been requested to watch for the Typhoon, and reported her as having been spoken by a British vessel at 7:15 a. m., Nov. 19. She came into New York Bay, Nov. 22.

The powerplant of Typhoon is single-cylinder Mianus oil-burning engine of modified Diesel type.

AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

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No. 23

Germany Grimly Hopeful for Her Aircraft Industry

With the factories shut down, the manufactured parts in scrap heaps and practically all existing planes surrendered, the Teutons are looking forward to the day when they will lead in commercial plane construction and in conduct of trade routes.

By W. F. Bradley

UNDER the terms of the Peace Treaty, Germany was ordered to cease airplane construction and to deliver the whole of her existing military aviation material to the Allies. In order to enforce this article of the treaty, an Allied mission having at its head Gen. Mastermann of the British Army, and Col. Dorand of the French Army, was sent into Germany with a staff of military and civilian experts from the French and British Flying Corps and from the aviation and automobile factories of the two countries. This mission has practically completed its work, and at the present time only a few members remain behind to round up any material which may have been overlooked and to supervise the destruction of ground organizations.

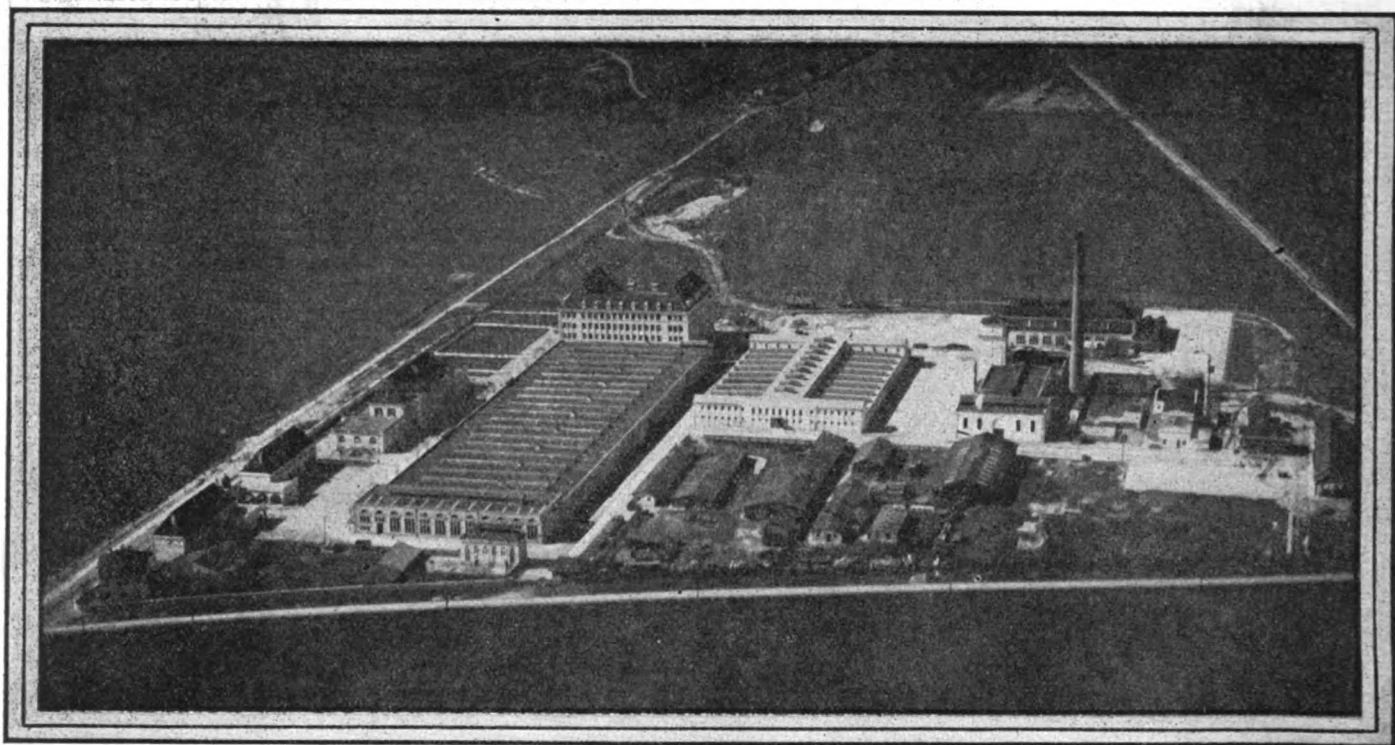
It is recognized, even by the Germans, that a very judicious choice was made in Gen. Mastermann and Col. Dorand. The latter, during the war, was head of the technical section of the Air Service of the French Army and is the designer of airplanes of very high merit.

The task which fell to this commission was not at all easy. Although the treaty of peace was signed on Nov. 11, 1918, its terms were not applied until Jan. 10, 1920. It was stipulated on this date that Germany would not be allowed to recommence air-

plane construction for six months, or until July 10, 1920. When this period expired, it was found that none of the conditions of the treaty had been fulfilled, and Germany was informed that she would not be allowed to recommence construction until three months after the complete execution of her obligations.

The arrangement gave considerable power to the Mission, for they alone had to determine what was military and what commercial material, and they alone could decide when all material had really been delivered or destroyed. But the interval of 15 months between the signing of the peace treaty and its application made the task of the Mission considerably more difficult, for Germany had had time to destroy or export much of the material required to be delivered, hordes of intermediaries endeavored to make money out of the situation and the revolution added still further to the disorder.

There is no doubt that the terms of the Peace Treaty calling for the delivery or destruction of all German military aviation material was much resented in that country. The difficulties which the Allies have experienced in order to get delivery of that material must not all be attributed to the action of the Government or to persons in authority.



Airplane view of Bayerische Motoren Werke near Munich

Intermediaries found various ways of getting possession of this material and they sought to sell it abroad with no other idea than a profit for themselves. There was a wild idea that aviation engines were of immense value and it not infrequently happened, in the 15 months preceding the application of the treaty, that quantities of engines would be bought at 1000 marks each and, after changing hands several times until they had reached 20,000 marks each, would be called in by Government order, paid for at a merely nominal sum, in order to be handed over to the Allies and thrown on the scrap heap.

Frequently members of the Allied Mission got track of hidden material by contact with intermediaries who were trying to negotiate sales. On the other hand, patriotic groups were unearthed from time to time with German aviation material in their possession which should have been declared and given up. Only a few days ago three million marks' worth of aviation engines were discovered hidden in a mill in Bavaria.

The policy of the Mission appears to have been that all aviation engines were military material and should be delivered. Planes are rather more delicate, for the line of demarcation is not at all clearly defined between a military and a commercial plane. In this matter the technical head of the Mission was sole judge, and his line of conduct was to ascertain whether any plane possessed qualities which allowed it to be used in war with equal advantage to Allied war planes of that particular class.

At the armistice Germany possessed 18,000 planes, of which about 5,000 were in regular service on the front, and 30,000 engines. During the war Germany built hardly more than 40,000 engines, but her policy was to entirely rebuild engines after a certain length of time in service. This is in contrast with the French system, under which practically no airplane engines were rebuilt. During the last year of the war the French factories produced 40,000 engines and repaired none. England again was repairing 1000 engines per month, 500 being handled in France and 500 at home.

At the end of October, 1920, it was considered that Germany did not possess a single airplane or engine

capable of being used for military service. It was quite possible, and this was admitted by the members of the Mission, that some planes and some engines might have escaped the vigilant search, but even on the broadest estimate this number could not attain 200.

While Germany possesses no flying material, her aviation factories and her army depots are well stocked with scrap. Thousands of engines have been smashed by the very expeditious method of sending a hammer head through the base chambers and through the cylinder walls. Planes have been stripped, the wing parts sawed through and the fuselage members broken, while huge stacks of propellers have been rendered unfit for further service by having their tips chopped off. Tons of un-machined forgings were lying on the heap for final disposal.

The German contention that these engines might have been used for commercial purposes was never seriously considered by the Allies. At the same time, much of the material used in the planes might have been salvaged instead of being thrown on the scrap heap. Hundreds of copper tanks were noticed in one depot which might have been cut along the seams in order to obtain sheets of metal. Instead they had been punched all over with a hammer. Wing spars and fuselage members also, have been sawed in several places, making them unfit for anything but the wood pile, whereas the lumber might have been saved for other purposes.

Numerous reports have been circulated to the effect that Germany still holds a strong aeronautical position. Even a little thought on the matter would show that this is incorrect, for with the armistice, Germany possessed practically nothing but military material and the Allies were authorized to take delivery of and destroy the whole of this. They have fulfilled their mission, and, at the same time, have prevented Germany building any planes without special permission, with the result that everything of a perishable nature has been destroyed and Germany finds herself with nothing more than a wealth of technical knowledge, which she intends to put to practical use at the earliest possible moment.

Manufacturers have not been the greatest obstacle against the fulfilment of the conditions of the treaty. They realized that the Allies would enforce the terms, despite any opposition, and as they could not recommence manufacture until three months after those conditions had been fulfilled, it was in their interests to get the punishment over as quickly as possible.

A description of the German aviation factories would be devoid of interest, for there are no aviation activities to describe.

At the Rumpler factory, near Augsburg, it was found that a staff of about 300 men was engaged in the repair of railroad trucks and in the manufacture of agricultural machinery. During the war the Augsburg factory employed about 1000 men and produced 400 machines, this being in addition to the planes produced at the original factory near Berlin. With the armistice all aviation work was arrested and for some time the factory was kept running, with a reduced staff, on the production of household furniture. A slump having set in, the furniture department was closed down and in September the works were being converted for the manufacture of agricultural machinery. Despite the rate of exchange, it was declared that American competition was severely felt in this branch of industry.

At the end of September the Rumpler Co. had in its possession 13 airplanes, which they had been allowed to retain by the Allied Mission. One of these was almost ready for flight, but the 12 others needed entire rebuilding. It was the intention of the company to put these machines into shape and to commence civilian services with them as early as possible.

Although it had very few machines capable of being put into flying condition, Rumpler possessed a wealth of junk. Chasse fuselages with their canvas torn off and main members sawed through; wings with the main spars sawed across, broken propellers, large numbers of smashed engines and immense quantities of tanks, fittings, etc., made fit for the junk heap by the use of saw and hammer.

It was stated that as soon as permission was given the Rumpler works would again be used for the construction of airplanes. Commercial services were going to be developed, and the directors were confident that when given liberty of action, Germany would gain a prominent position in world aviation.

As in other countries, German aviation engines were generally built in the automobile factories, Benz and Mercedes being the most important producers. The biggest factory erected specially for the production of aviation engines is the Bayerische Motoren Werke near Munich, where, a very successful six-cylinder aviation engine generally known as the BMW was built.

At the beginning of the war this firm had a small factory employing 16 men. At the armistice they were employing 2400 men and producing 150 motors a month, with prospects of an early increase to 250 a month. Erected on a vast plain outside Munich, the BMW are a very fine example of modern factory layout and equipment. With the exception of the offices, all buildings were one story, for almost unlimited space was available. The buildings are light, airy and intelligently planned in relation one to the other. The machinery was all put in during the war and is thoroughly modern. A big Fokker airplane factory exists about half a mile away, and it is to this that many of the BMW engines were delivered, while the whole of the surrounding ground is ideal for airplane testing purposes.

The peace terms made it impossible for BMW to continue manufacturing aviation engines, but the big factory has been very cleverly converted to other work and

is employing 1400 men in the production of 1000 railroad brakes a month and 60 to 70 engines for truck, stationary and boat use.

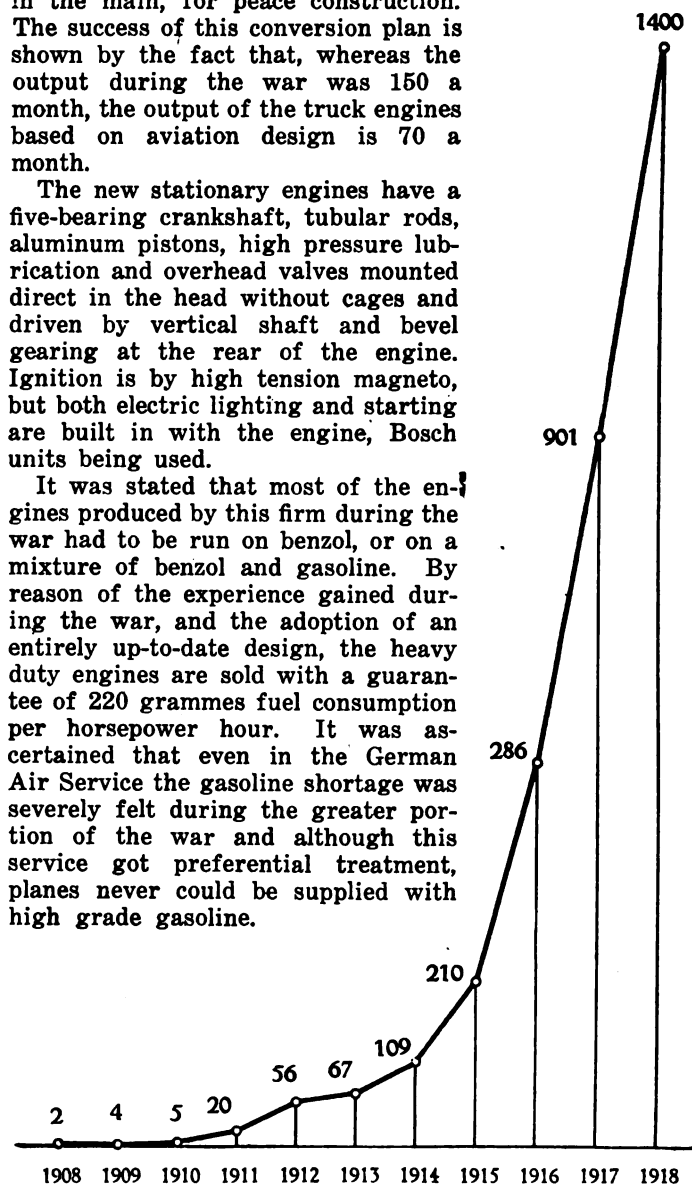
In addition, the shops are preparing to get into production on a very fine type of twin cylinder engine for motorcycles or cyclecars. This engine has two horizontal cylinders with L-head and enclosed valves, mounted on an aluminum base chamber which forms oil reservoir. A ball bearing crankshaft is used, connecting rods are tubular, aluminum pistons are employed and the engine, which is an unusually smart production in its class, runs up to 3,400 under load.

A factory erected exclusively for aviation engine work and having no commercial connection with other branches of industry, undoubtedly found itself in a worse position, at the armistice, than older established firms with broader connections. This, however, does not appear to have seriously interfered with the prosperity of the BMW. The aviation type engine has been modified for truck, boat and stationary work. Instead of being produced with six steel cylinders, it is built with four cast-iron cylinders but the design is the same and the tool equipment got together during the war is available, in the main, for peace construction.

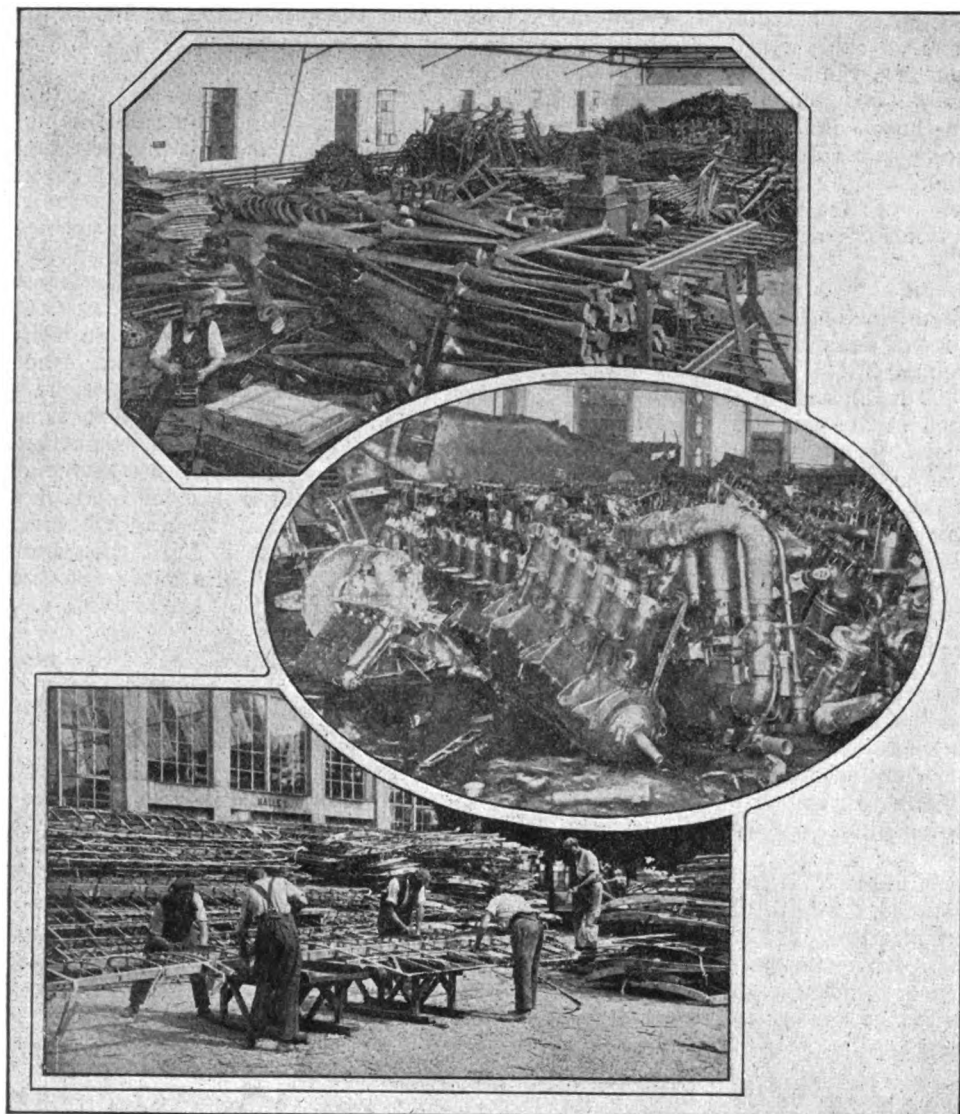
The success of this conversion plan is shown by the fact that, whereas the output during the war was 150 a month, the output of the truck engines based on aviation design is 70 a month.

The new stationary engines have a five-bearing crankshaft, tubular rods, aluminum pistons, high pressure lubrication and overhead valves mounted direct in the head without cages and driven by vertical shaft and bevel gearing at the rear of the engine. Ignition is by high tension magneto, but both electric lighting and starting are built in with the engine, Bosch units being used.

It was stated that most of the engines produced by this firm during the war had to be run on benzol, or on a mixture of benzol and gasoline. By reason of the experience gained during the war, and the adoption of an entirely up-to-date design, the heavy duty engines are sold with a guarantee of 220 grammes fuel consumption per horsepower hour. It was ascertained that even in the German Air Service the gasoline shortage was severely felt during the greater portion of the war and although this service got preferential treatment, planes never could be supplied with high grade gasoline.



Rumpler airplane production from 1908 to 1918. The company has two factories, one at Johannisthal, near Berlin, and the other at Augsburg, in Bavaria



Top—German airplane propellers sawed up by order of Allies. Oval—Airplane engines destroyed under the Peace Treaty. A Hispano-Suiza is seen in the foreground—probably a captured engine. Bottom—Clipping Germany's wings—scene in a German airplane factory

The BMW stated that its supply of coal was very unsatisfactory, no deliveries being made from Silesia and the Saar districts. Since the armistice every known kind of fuel had been employed for the furnaces.

The company has its own aluminum foundry and makes a large number of castings for outside use, as well as meeting all its own requirements. It has no iron foundry. Its stores of raw material were considerable.

Last March a Soviet was declared in Munich and for four weeks the entire BMW factory was held by the revolutionary party, backed by 300 rifles and machine guns. After four successive weeks without pay, the movement collapsed and the men returned to work under the old conditions. It was admitted that discontent prevailed, and that the movement was of a political nature, but as an indication that the "Reds" have not a very strong hold on the workers, a two-hour strike was ordered as a protest against the arrest, in Munich, of the Socialist Deputy, Dr. Eisenberger, for the day on which I visited the factory, but not a man left his work. The working hours in this factory are 46 per week, the working day being divided into two sections by a break of half an hour for a light midday meal. Wages vary from 4 to 6 marks an hour, which is lower than in other parts of Germany. It should be mentioned, however,

that the cost of living is rather cheaper in Bavaria than elsewhere, and food supplies are more plentiful.

As soon as allowed by the Allied Commission, the BMW will renew airplane engine construction. At the present time this is stopped and large numbers of forgings and cylinders which were in hand when the armistice came into effect are lying on the scrap heap. The claim is made that the BMW holds the world's height record of 9760 meters (32,020.4 feet), established on June 17, 1919, with a D.W.F. biplane piloted by Lieut. Diemer. This record is official in Germany, but has no international standing.

The entire fleet of German military airships had to be delivered to the Allies. Most of these have been handed over and the rest will be given up soon. Five have been destroyed by Germany and, as compensation, the Allies have claimed delivery of the Bodensee and the Nordstern. All military airship drawings have to be given up. Germany has not by any means lost her faith in the Zeppelin and plans are being laid to build bigger ships than were used during the war. Only recently it was discovered that work had begun at Friedrichshafen on airships of 108,000 cubic meters. Under the powers conferred by the peace treaty this work was stopped. The Zeppelin company is also interested in commercial airplanes.

Many exaggerated stories have been circulated regarding Germany's aeronautical situation. At the present time she possesses neither heavier nor lighter than

air machines, and certainly she is not in a position to build trans-Atlantic airships for next year, as has been claimed by certain writers.

Even with assistance from America, no ships of the required capacity could be built within this time limit, for although American interests may have the necessary financial strength, there is an entire absence in the United States of the skilled labor required for this work, and there are no buildings in existence for the construction of these machines, nor for housing them after being built. A Berlin-New York airship service for June, 1921, is nothing more than a wild dream.

Germany has a large number of airplane services and a large number of air navigation companies on paper. Numbers of these possess a central office, a staff of officials, a single plane and a pilot. They are merely figure-heads behind which it is intended to build an aerial navigation company as soon as circumstances admit.

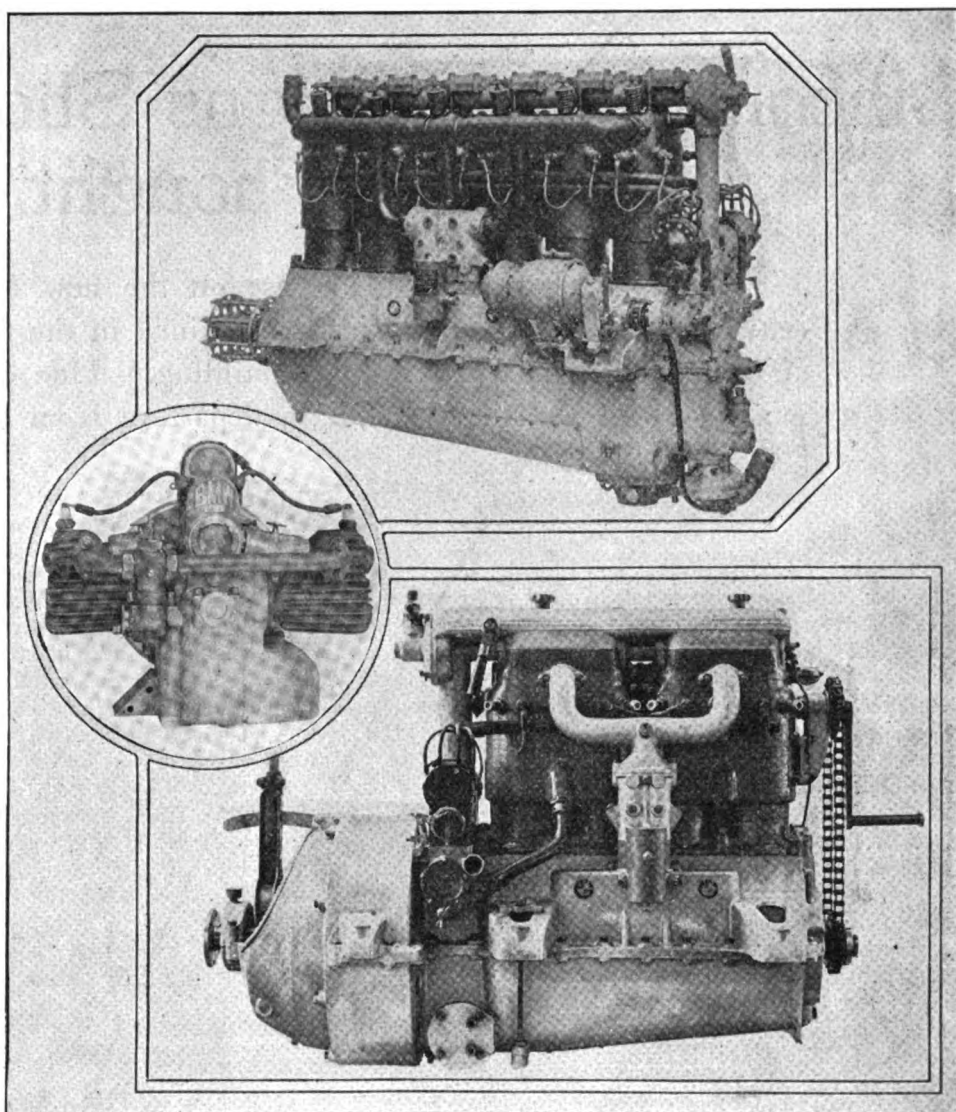
During the Leipzig fair there was a regular service between that city and Berlin, but none exists at the present time. A Berlin-Munich line is supposed to be in existence, but although Rumpler has a factory in each of these two towns, it was impossible, last September, to find a plane in condition to make the trip from Berlin to the Bavarian capital.

Internationally Germany is most interested in airplane services with the Scandinavian countries and has recently established a daily service with Copenhagen. A five-countries line from Berlin to Sweden, Norway, Denmark, with extension to London, has also been formed and an effort is being made to run it daily. Germany's only outlet for the present lies in this direction. There is little intercourse with France and Belgium and no encouragement to run a direct service with London. Traffic with Russia is not possible, and the prospects are not very brilliant at the present time for air services with Italy and Austria.

Germany appears to be much more concerned at the present time about the fate of her airship centers than the condition of her industry. There are five in existence and all have to be delivered to the Allies. The cost of pulling down, transporting and rebuilding each of these airship centers may be estimated at \$500,000, but this is only about one-sixth of the actual value of the plants.

As both France and England are interested in the development of Eastern lines, which must cross German territory, the German argument is that all ground organizations should be allowed to remain.

Undoubtedly there is some truth in this, but the Allies are so afraid of Germany gaining a lead in aerial navigation that undoubtedly they will insist on the total destruction of German ground organizations, even if it is necessary for them at a very early date to rebuild some of these organizations for their own lines across Germany to the East.



Top—BMW airplane engine—one of the most successful German types. Circle—Twin cylinder motorcycle or cyclecar engine produced by BMW since the armistice. Bottom—BMW heavy duty engine based on airplane engine design. It is sold with a guaranteed fuel consumption of 220 grams per horsepower-hour

New Italian Import Duties

ITALIAN newspapers repeatedly have protested against the tariff duty levied on Italian automobiles in France, Great Britain and the United States. The *Gazetta Ufficiale* of Sept. 14 published a decree which will be submitted to Parliament, to be enacted into a law. According to it, chassis, automobiles, motor trucks, motor tractors, motor fire engines, etc., imported into Italy will be subject to the following scale of duties:

Up to 880 lb., 120 gold liras per 220 lb. (\$107 per 1000 lb.).

From 880 to 1980 lb., 115 liras per 220 lb. (\$102.50 per 1000 lb.).

From 1980 to 3520 lb., 65 gold liras per 220 lb. (\$58 per 1000 lb.).

From 3520 to 5500 lb., 75 gold liras per 220 lb. (\$67 per 1000 lb.).

From 5500 to 8800 lb., 95 gold liras per 220 lb. (\$85 per 1000 lb.).

Over 8800 lb., 60 gold liras per 220 lb. (\$53.50 per 1000 lb.).

On automobiles weighing up to 5500 lb. there will be imposed, in addition to the duty based on the weight, an ad valorem duty of 35 per cent.

Automobile frames will pay 70 gold liras per 220 lb.; change speed gears, 110 gold liras per 220 lb.; complete rear axles, 90 gold liras per 220 lb. In addition, these frames, change speed gears and rear axles will be subjected to an ad valorem tax of 30 per cent.

The new tariff is undoubtedly intended to make the importation of foreign automobiles into Italy very difficult.

A RECENT wage survey covering a period some ten months ago showed skilled mechanics in a typical French automobile factory to be receiving between 26 and 30 francs for an eight-hour-day's work; that is, between \$5 and \$5.80, figuring the franc at the normal rate of exchange. During the last quarter of 1919, the same class of workers in Italy received from 15 to 18 lire a day; that is, \$3 to \$3.60. This later survey included all types of manufacturing plants.

Lincoln Body Designs Show Constructive Thought

Six body models provided for use on the new Lincoln chassis. A critical analysis of these models is contained in the following article by an authority on automobile body building. Line cuts of the various models are shown, thus marking a departure from the usual reticence

By George J. Mercer

THE body models of the new Lincoln are eight in number and comprise five and seven-passenger touring, roadster, four-passenger coupe, five-passenger sedan, five-passenger town brougham, town car and suburban limousine. The first five are mounted on the 130-in. wheel-base chassis and the last two on the 136-in. wheelbase.

The touring bodies are here illustrated by the seven-passenger model (Fig. 1) and the closed bodies by a similar illustration of the sedan (Fig. 2). The line drawings show all the models, the essential dimensions being indicated by figures.

These line cuts are worthy of more than ordinary attention, since they show the commendable spirit in which the Lincoln Motor Car Co. has been willing to co-operate and furnish what is generally regarded as "inside information" of the seat sizes, head room, etc. It has seemed strange to the writer that the mechanical parts of a car will be elaborately dimensioned and the reading public fully informed, while the body features will be made to appear mysterious. The Lincoln Motor Car Co. is to be credited with breaking away from this idea.

Body dimensions can be varied considerably, but a body that is a standard model and made in quantities must, in the last analysis, be of proper proportions to fit the average person, and the public should be as conversant with the seating dimensions as they are with the number of cylinders and the bore and stroke figures.

The touring models are similar in design. The five-passenger, which is termed phaeton, is shorter and carries the extra tires at the rear, raked forward, instead of aft

as in the larger body. A line drawing of the touring model is shown in Fig. 5 and of the phaeton in Fig. 6. These bodies are conventional in design and present a moderate and conservative exterior. The benefit of the long high hood and shroud or cowl is in the low appearance of the body sides. These are really 23 in. high, but the comparison with the front minimizes this height. Consequently a low looking side is obtained while the height necessary for comfort and protection is preserved.

A front view shows the radiator to be rounded, while a straight effect is obtained by the top side line and the line of bending; that is, the line where the straight side bends to meet the top sheet of the shroud and hood conforms to make a high light that apparently continues the body side line to the front. To carry out this effect ideally, the radius should be smaller than is shown on

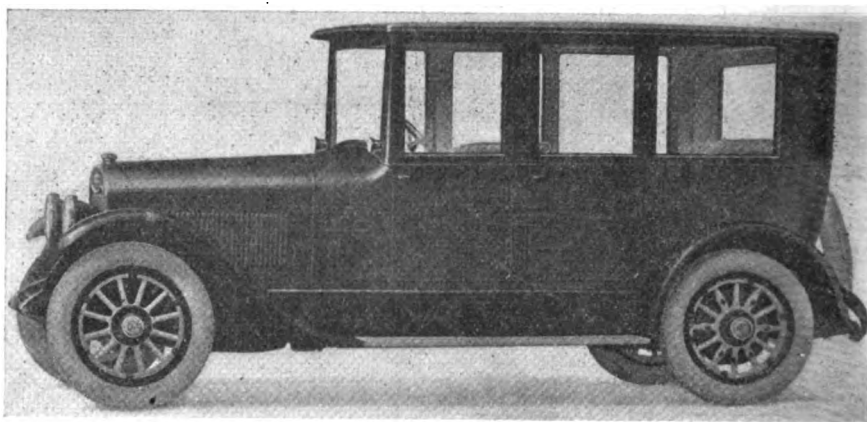


Fig. 2—Five-passenger sedan

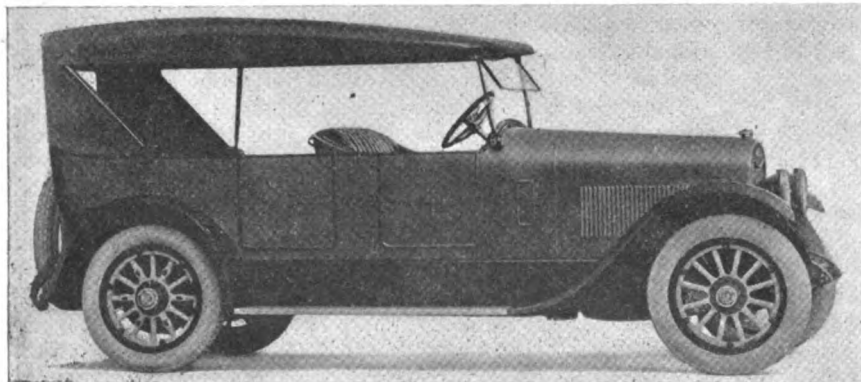


Fig. 1—Seven-passenger touring car

these models so as to bring the turning point higher, but, provided it is a parallel line as herein shown, the effect is always harmonious.

The top edge of the body is flat, with a moulding that is continuous. There is also a moulding edge to the doors. All these mouldings are pressed in the panel and the panels, on the open bodies, are 18 gage steel. All the doors are hinged at the front with concealed hinges and inside and outside door handles. There are ventilators on the sides and the hood louvers are narrow and close. The mudguards are full crown with design pressed edge; they are well-shaped and very strong.

The two-piece windshield is only slightly slanted from the perpendicular and carries small lamps at each side at the base.

The top is of conventional pattern with gypsy quarter and $7\frac{1}{2} \times 19\frac{1}{2}$ rectangular glass back light. The rear support iron, for the top when down, is carried in the tool kit and adjusted only when wanted.

The sectional view of the tonneau (Fig. 3) will show how the storm curtains are carried when not in use. The back of the seat is pleated the same as the sides and seats and, when closed, reveals no appearance of a door. This view also shows the tonneau light and the flexible robe rail, and in the seven-passenger car there is a plated foot rest.

The other sectional view (Fig. 4) shows the front compartment with pocket in the doors for small tools and a sliding drawer under the seat. This drawer pulls out from the side and is for tools also. The door pocket carries

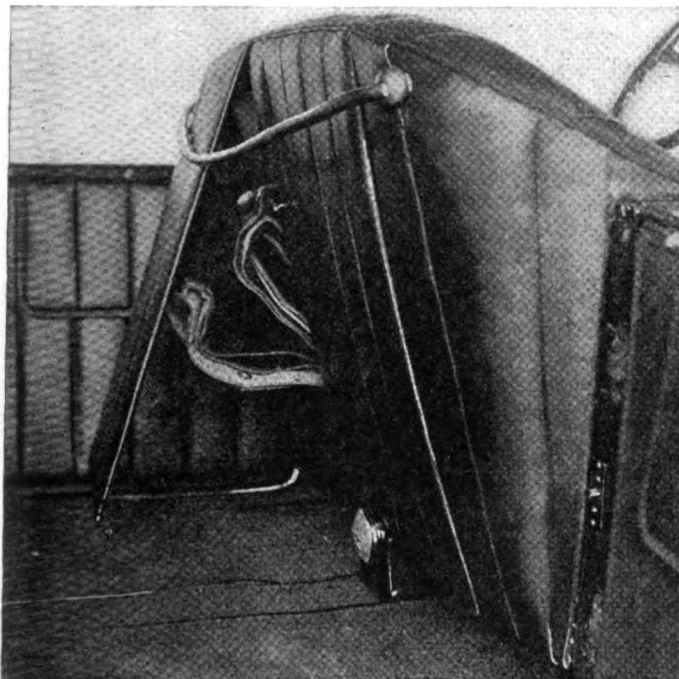


Fig. 3—Sectional view of tonneau of touring models

only the light tools. The drawer is accessible without disturbing the person seated.

The trimming design as shown by the illustrations is the French pleat; the material is black leather.

The line cuts show all the principal dimensions of head room, seat spacing, location of steering wheel, etc., and are ample for anyone wishing specific information of the interior sizes.

The roadster (Fig. 7) carries three passengers. The seating is clover leaf with doors at the front, passage between the seats and luggage compartment at the rear.

The rear mudguards are different from the touring model, but much of the general description given of the former will apply, while the line cut will give all the dimensions required.

The designing of a roadster is more of an open question than any other model. In fact, the roadster is a series of models, and it is a question of picking out the one that your particular trade calls for most. The majority of types consider the feature of carrying an extra passenger. In the design shown, the extra passenger is better provided for than when he must sit in the luggage well at the rear. With a long wheelbase of 130 in., this design has good sound sense for utility, compactness and comfort.

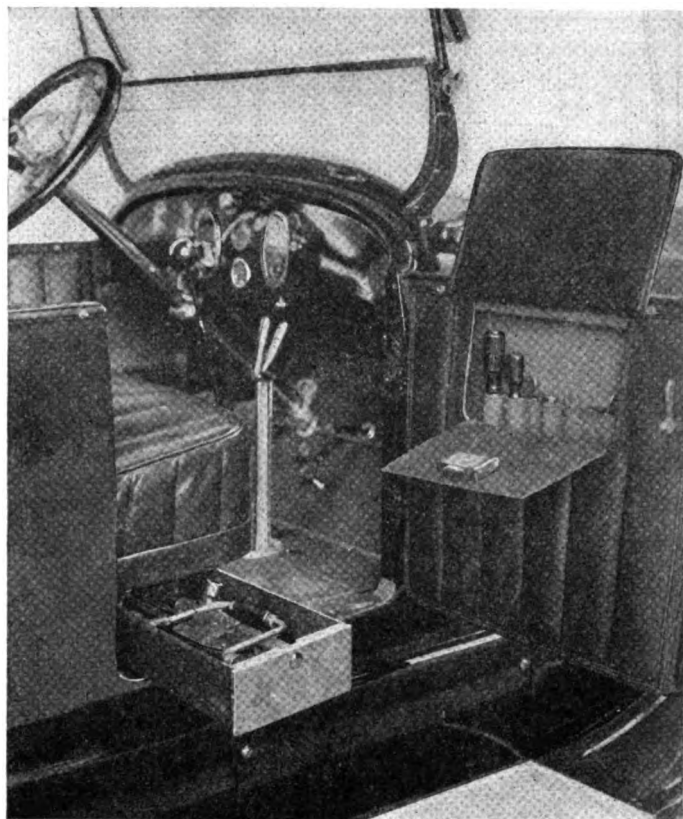


Fig. 4—Sectional view of front compartment

The four-passenger coupe (Fig. 8) has some features similar to the roadster. As regards the rear compartment and the rear mudguards, for instance, the arrangements for seating are similar but more expansive in the coupe. The latter also has individual front seats with aisle between and a right hand seat which folds over for entrance.

The five-passenger sedan is illustrated by a photograph (Fig. 2). This gives a good view of the interior showing the trimming design, curtains, etc. The angle at which the front shows indicates the shape of the lower part of the windshield following the curve of the shroud, and also the blending of the shroud corner with the pillar and the belt molding, which is continuous across the front as well as back. The measure of round on the rear corner is also illustrated.

The drip molding is continuous all around and the top corners of the windows have a small radius. The front pillar is slightly tapered, being about $\frac{5}{8}$ in. thicker at the bottom than at the top. This gives enough slant to the windshield glass to obviate reflecting the rays from street lamps. The dash lamps are located at the base of this pillar. The doors have molding all around with small round bottom corners and concealed hinges.

On the closed bodies, the doors are hinged at the rear and all models have full doors.

The straight line effect is fairly well distributed. The roof molding line is straight while the roof is thin and extends sensibly beyond the front glass.

Aluminum panels are used on the closed bodies, 14 gage below the belt and 16 gage above. A line drawing of this model is shown in Fig. 9.

The other closed body on the 130-in. wheelbase chassis is the town brougham (Fig. 10). This is very similar to the sedan in size and design except that there is a division back of the driving seat which makes this model a chauffeur-driven or two-compartment car. The line drawings will amply supply all the dimension data and the gen-

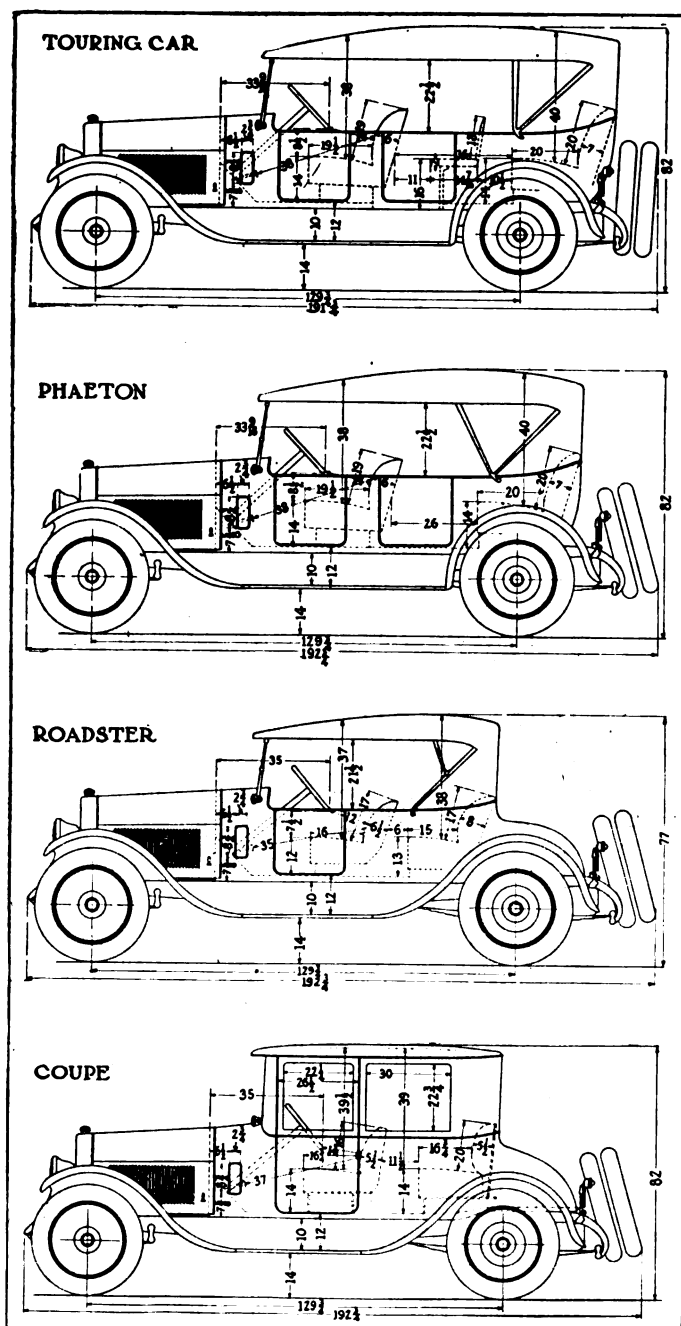


Fig. 5—Touring car. Fig. 6—Phaeton. Fig. 7—Roadster. Fig. 8—Coupe

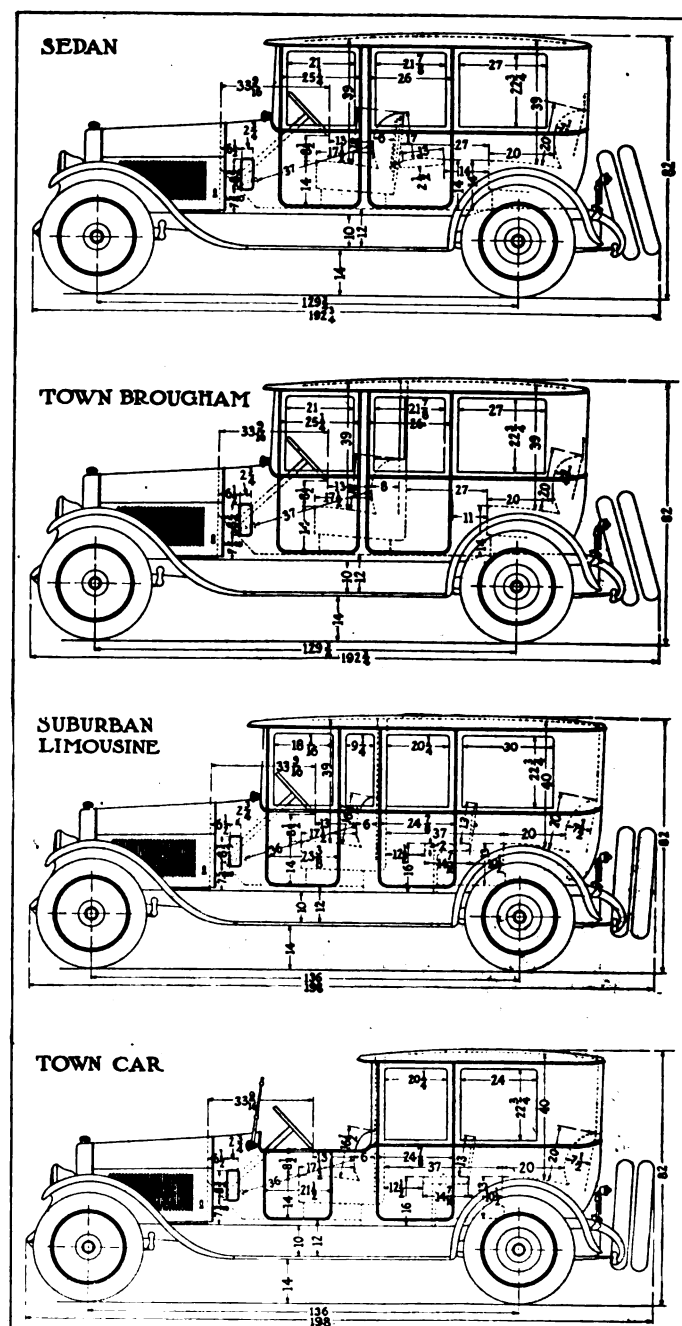


Fig. 9—Sedan. Fig. 10—Town brougham. Fig. 11—Suburban limousine. Fig. 12—Town car

eral description of the sedan will apply for this model as well.

The two models mounted on the 136-in. wheelbase chassis are a suburban limousine (Fig. 11) and the town car (Fig. 12), both of which are illustrated by line drawings.

The first named has a seven-passenger body with adjustable glass division at the rear of the driving seat. The town car, as its name implies, is one in which the chauffeur is entirely outside.

The interior trimming design on all closed models is the French pleat and the material is varied, customers being allowed to choose from a sample case. There is one dome light in the roof and no reading lamps. The colors are blue body with belt stripe and blue wheels with striping and black enamel hoods, radiators and mud guards.

The range of body models is, to say the least, comprehensive. Every model that belongs to this type of car is at hand. All the body models show the result of careful, deliberate and constructive thought. The final effect of

this work has produced a full line of high class, well designed and harmonious models that attract one by virtue of real merit.

Uniform Garage Charges in Paris

A UNIFORM rate for garage charges has been established at Paris, according to the American Chamber of Commerce in Paris, which states that the arrangement was made by the Chambre Syndicale du Commerce Automobile and the garage proprietors. Cars having a length of 3½ meters will be cared for on a basis of 150 francs monthly; up to 5 meters the charge will be 210 francs and above that the rate will be agreed upon. The daily rate for cars with a maximum length of 5 meters is 10 francs. Clients are informed that "in order to take advantage of these prices they must buy their supplies, such as gasoline, oil and tires, from the garage."

The British House Lighting Sets and Sales Problems

The manufacture of this equipment has been a war-time development and the formation of the sales has not kept pace with the production. Garagemen have not met the opportunity offered to them. Ship lighting plants are quite an item in manufacturing development.

By M. W. Bourdon

PRIOR to the war it was difficult for the house-owner desiring to install a small electric house-lighting set to find a British standardized equipment or an assembled outfit. But now there are fully a dozen British concerns prepared to supply reasonably priced standard installations of from $\frac{3}{4}$ kw. up to any size that may be required. Nevertheless, the smallest sizes are obtainable only from four or five makers. Among these, the four-cycle water-cooled engine with single cylinder predominates, but one small set has a two-cycle engine, while another has air-cooling with an aluminum cylinder having a cast iron liner, detachable head and overhead valves.

Austin alone among automobile manufacturers is interested in these small house-lighting sets, and has a range of five standard sizes with engines varying from a single-cylinder of $3\frac{1}{2}$ hp. to a four-cylinder of 22 hp., the prices varying from \$650 complete to \$3,700 without battery.

Dealing generally with house-lighting sets of all sizes, the non-automatic plant is most common. In fact, not all the small sets of $\frac{3}{4}$ to 1 kw. capable of supplying current for 30 to 60 lights are automatically regulated. One compact outfit, the Pelaphone, with a two-cycle engine built into the dynamo casing, starts automatically when the batteries are discharged and stops automatically when they are charged. Aster, who makes the air-cooling set referred to, merely provides for motorizing the generator by a hand controlled switch. Austin, however, goes all the way, and not only arranges for the automatic control of engine starting and stopping, but provides for complete self-regulation by fitting a thermostat which changes over the fuel supply from gasoline to kerosene after the engine has warmed up from a cold start. In sets above $1\frac{1}{2}$ kw. crank starting prevails.

In the small sets, the water circulation is by thermosyphon, and a cylindrical tank with a good head above the engine is used as the water container. In the larger outfits, pump circulation predominates, with a truck type of

radiator of the vertical gilled tube pattern and having behind it a cowled belt-driven fan. Austin uses for his smaller plant a house-lighting type of cast iron radiator with six vertical tubes 4 ft. 6 in. in height. This is fitted in conjunction with thermosyphon circulation.

There is no uniformity in engine lubrication systems, which vary from the simple drip and splash to the hollow shaft arrangement giving oil under pressure to main and big-end bearings with splash to the cylinders.

The great majority of house-lighting engines use gasoline for starting and kerosene as the normal fuel. Vaporizers generally consist merely of exhaust jacketed mixing-chambers, while in one or two cases no special provision is made other than a hot air pipe.

There are in England at the present time more concerns offering ships' lighting sets than those for house-lighting. These marine equipments are all of the four-cycle type in engine design, and run up to high powers, but as a rule the engines only are supplied by the manufacturers, the customers of the latter being electric lighting contractors.

There is no settled policy among makers as to merchandising house-lighting sets. It certainly is not considered that the average garageman is in a position

to run a satisfactory sales and service organization with his present facilities and staff. He might be able to place a few sets casually among his local customers on the private car side; but his capabilities in this way are limited, for, while his personality counts within a defined sphere, it does not extend over more than a fraction of the ground to be covered.

To make a success of the house-lighting business from his own standpoint, and from the standpoints of the maker he represents and the man he supplies, he has got to go into it all the way; in other words, he must organize a special department with a responsible and capable man in charge, one with experience not only with internal combustion engines, but with all the many details of the in-

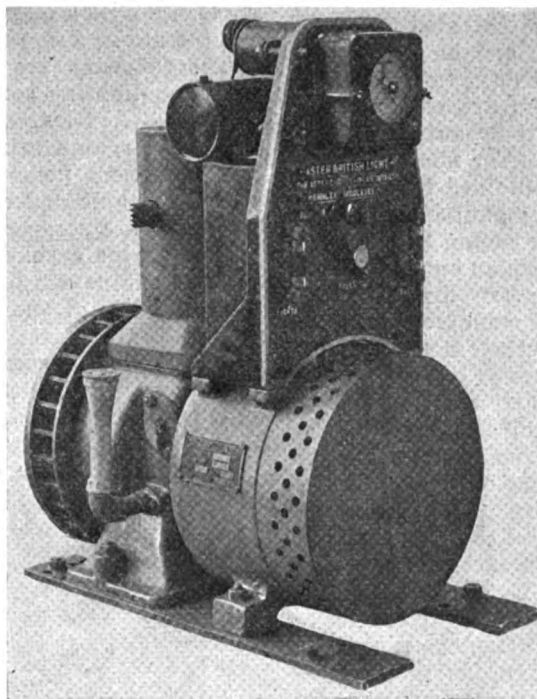


Fig. 1—Aster 1-kw. outfit with air-cooled engine

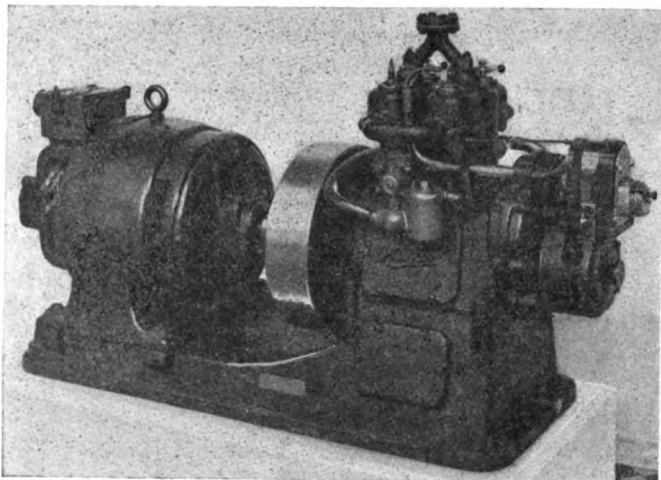


Fig. 2—Austin 2.1-kw. equipment with $3\frac{1}{2}$ -hp. two-cylinder $3 \times 3\frac{1}{2}$ in. engine

stallation that have to do with the generation of current, control, wiring and so forth. He must have capable men for wiring the houses of purchasers, for the latter will not be satisfied with handing over a check for a generating set; obviously they will want the plant, wiring and lamps installed and will expect satisfactory service subsequently.

At present, then, the garageman is not able to handle lighting sets from beginning to end, and he will not be able to do so until he runs a special department for the purpose. As a result, the men to whom British equipment makers are looking to merchandise their outfits are the house-lighting contractors, and Austin for one announces to the public that his sets "can be obtained from house-lighting contractors and from the manufacturers," no mention being made of garagemen or automobile dealers.

But the question is not settled by such an announcement. The makers of these small sets are mostly firms that are primarily internal combustion engine manufacturers, and whether they are going to dispose of their house-lighting equipments through electrical engineers or otherwise, this part of their business will not be a mere side line but an entirely new branch, one that will require a separate sales staff with experience in handling electrical equipments and preferably some personal acquaintance with the house-lighting engineers and dealers who are to be approached to act as agents.

But even so, the house-lighting engineer cannot give complete service. Neither he nor his usual staff have any more than a smattering of knowledge concerning the power plant; they are as much at a loss in fitting up, tuning, or repairing an internal combustion engine as the garageman is in doing similar work on a generator, switchboard or wiring.

No matter from which end one looks at this house-lighting business, it is apparent that it is a specialist's job. There must be departmentizing by both manufacturer and dealer.

In England the solution of the problem, in the writer's opinion, appears to be for the maker to allocate a wide area to each of a number of the biggest garagemen who will agree to run a separate department. These area dealers must appoint sub-agents in every small town, who will bring their personal influence to bear upon likely customers in their localities and be able to call in the specialists from the area dealer's staff when questions of installation and purely electrical matters crop up for discussion, contract or service. The latter will probably more often relate to the power plant, and the local garagemen will be able to tackle this side without assistance.

At present there is no one in whom the prospective purchaser can repose his entire confidence. He may trust the local electrical engineer to see him right in the electrical details of the equipment, both in selling him an outfit and providing service; but he well knows that this class of dealer may be even more ignorant concerning the power plant than he is himself. The garagemen he would trust to sell him a satisfactory engine, but he well knows the shortcomings of this man on the electrical side. But if he be approached by the local garageman, knowing that the latter has behind him the staff and facilities of an area dealer running this business as a special department, he will realize that satisfactory installation and service can be provided.

The alternative cuts out the local sub-agents, and involves the area dealer in a direct sales campaign over his whole district; the question is whether he will in many cases be prepared to launch out to this extent into an entirely new field.

Whatever plan he adopts, however, he must departmentize; if he does not, he will see the house-lighting business go past him and be taken up by the local house-lighting engineer, who, as matters are, may well be looked upon by the prospect as the lesser of two evils. But this will not be conducive to the best possible volume of sales, and therefore the manufacturer will suffer. Once more, then, it comes back to the latter, and he, through a special department under a capable chief, will have to organize and supervise a plan of campaign not only for the factory but for the dealer also.

The following are general particulars of typical British house-lighting sets:

Aster.—A 1-kw. equipment which it is intended to make in large quantities. It has an air-cooled engine and the equipment generally bears close resemblance to the Delco. Engine and dynamo are mounted as a unit, with the armature secured to a spider forming a prolongation of the engine crankshaft. The control is non-automatic, but the engine can be started by motoring the generator. The latter is of the four-pole pattern and runs at 1000 r.p.m.

The air-cooled engine is a four-cycle type, with a bore and stroke of $2\frac{7}{16} \times 3\frac{1}{2}$ in. It has overhead valves actuated by push rods in a detachable cast iron head, the valve rocker pins operating in oilless bushings. The cylinder is of aluminum with a cast iron liner and has longitudinal

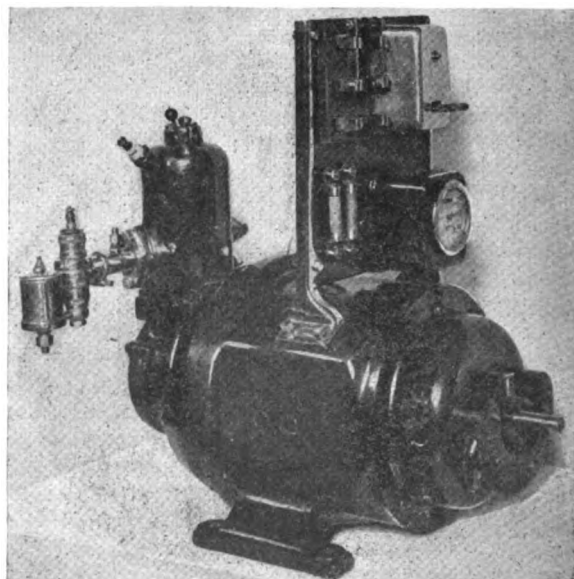


Fig. 3—Pelaphone $\frac{3}{4}$ -kw. automatic installation; has two-cycle $3 \times 3\frac{1}{2}$ in. engine, with flywheel in generator casing

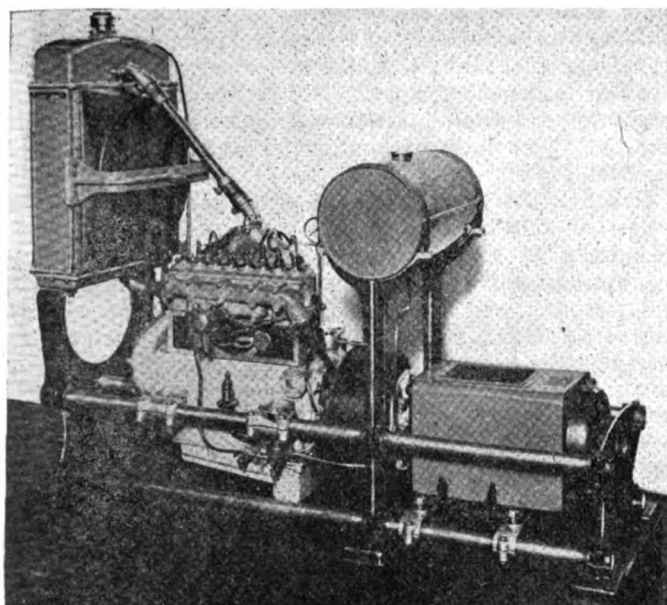


Fig. 4—Fyfe-Wilson 4½-kw. outfit on tubular base. Has a 10-hp. four-cylinder block engine of light car type

fins enclosed in a detachable sheet metal jacket, the latter having a cap of similar material enclosing the cylinder head and valve gear. The piston is also of aluminum, has three compression rings and a fourth ring locating the piston pin, which floats in the piston bosses and in a phosphor bronze bush in the small end of the connecting rod.

Air is drawn through the cylinder casing from holes in the cap by an exhaustor type fan which forms the flywheel. The crankshaft runs in roller bearings, a ball thrust bearing being provided at the dynamo end. Lubrication is on the circulating splash system, with a plunger pump, while ignition is by battery and coil, the contact breaker being mounted on the end of the transverse camshaft, itself driven by skew gearing and enclosed within the crankcase. The switchboard is mounted over the dynamo. The price of the complete installation with a battery of 14 glass cells having a capacity of 170 amp. hr., is \$810.

Several larger sets for house and ship lighting are also made under this name. These, however, have engine and dynamo separately mounted on a base plate with a coupling between the two shafts. An example is the 2 kw. set with a 6 hp. single-cylinder four-cycle engine, with drip and splash lubrication and burning either gasoline or kerosene, the price being \$900 for engine, generator, switchboard, etc., but without battery. Another typical set is a 6 kw. outfit with a 9 hp. two-cylinder 3½ x 4¾ in. engine, having hollow shaft lubrication. This equipment sells without battery, but otherwise complete, at \$1,425.

Austin.—The smallest equipment of a range of five types is the ¾ kw. set with a compound wound dynamo which, at option, may be 25 volt, 30 amp. or 50 volt, 15 amp. A single-cylinder water-cooled four-cycle 2¾ x 3½ in. engine, rated at 1¾ hp. and running at 1100 r.p.m., forms the power unit; it is mounted on a cast iron bed plate with the dynamo. Full automatic control is provided, the engine being self-starting, self-regulating and self-stopping, while a thermostat control is provided for the change over from gasoline fuel at starting to kerosene for normal running. Thermosyphon water circulation is used with a house-heating type of radiator intended to be mounted adjacent to the engine and dynamo unit on a separate concrete base. For ignition a coil system is used, the current being taken from the batteries for starting and from the dynamo direct for normal running. This instal-

lation, complete with a 14 cell 144 ampere-hour battery, is offered at \$650. The next largest size, the 2.1 kw., has a two-cylinder 3 x 3½ in. water-cooled engine, the dynamo voltage being 50 to 70. Full automatic control is provided, and the price for the complete outfit without battery is \$1,200.

A 3.6 kw. 140 volt plant has a four-cylinder 6-7 hp. three-cylinder 2½ x 3½ in. engine. This outfit without battery sells at \$1,600, equipped for using gasoline as fuel. It is also supplied for burning kerosene at a small extra charge and can be had either in the automatic control type or hand-controlled.

The largest set has a 22 hp. four-cylinder engine, using either gasoline or kerosene, and running at 800 r.p.m.; the dynamo generates current at 100 volts, the output being 90-100 amperes. All Austin lighting sets, except the smallest size, have a centrifugal type governor acting on the carburetor throttle. Separate cylinders are general, and when kerosene is to be used as fuel, an exhaust heated vaporizer is fitted with two float chambers, one serving for gasoline for starting. The thermostat control for the change-over valve appears on all automatic models, and the same applies to magneto ignition.

Pelaphone.—Engine and dynamo are mounted as a unit in the ¾ kw. set, which is supplied in two models, either 25 volt or 50 volt, both with a shunt wound generator. The flywheel of the two-cycle 3 x 3½ in. engine is arranged within the dynamo casing and serves to form one end-plate for the armature. The switchboard is mounted above the generator. The outfit is fully automatic so far as starting and stopping the engine is concerned, and is sold complete with battery for the 25 volt set, including all piping, stand for water tank, muffler, fuel and water tanks (latter 18 in. diameter by 48 in. high) at \$700. The engine runs on gasoline and has splash lubrication, the oil being fed by drip into the induction pipe. Coil and battery ignition is used; no governor is fitted to control the normal speed at 1100 r.p.m.

The larger Pelaphone sets have separate units, the engine and dynamo being directly coupled on the same base plate. The range comprises 2½, 5, 8 and 10 kw. sets, with one, two, three and four-cylinder engines, respectively. The latter are of the four-cycle type, all with a bore and stroke of 4½ x 5 in., with separate cylinders, L heads and magneto ignition. Kerosene is the normal fuel, vaporized

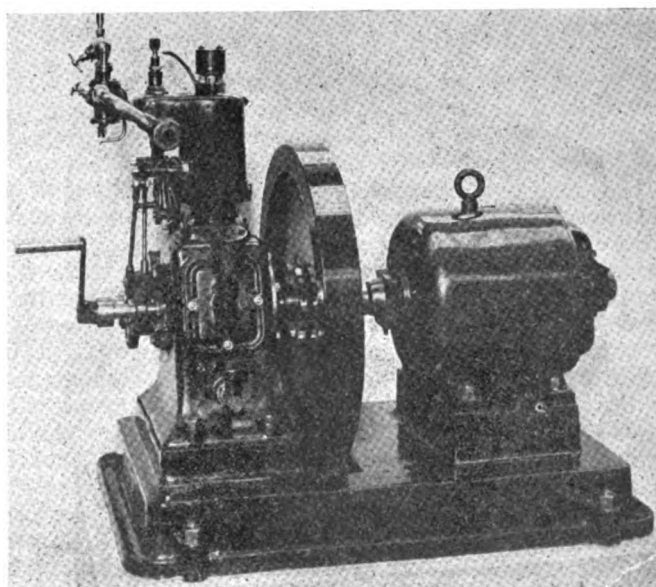


Fig. 5—The Gardner ½-kw. set. The 1¼-hp. engine burns kerosene, has eccentric valve gear and hit-miss type governor

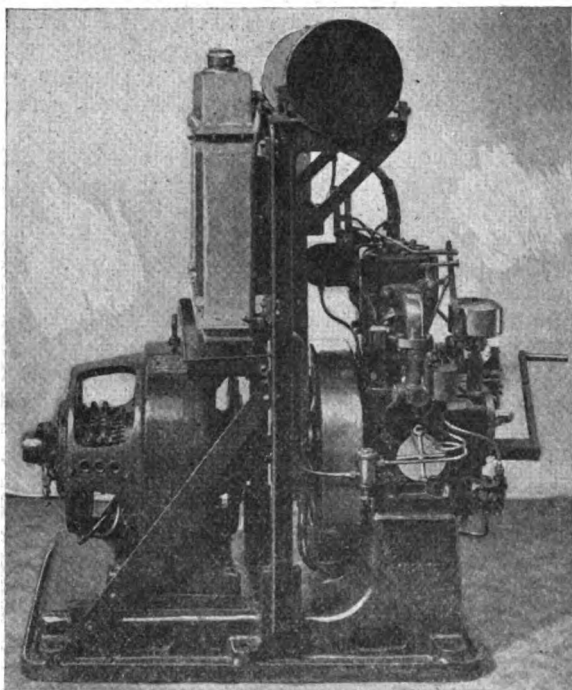


Fig. 6—The Parsons 4-kw. set has a 7-hp. single cylinder $4\frac{1}{2} \times 6$ in. engine burning kerosene

in a combined inlet and exhaust manifold. All except the single-cylinder model have hollow shaft lubrication with a plunger type pump. Prices for the complete installations are: One-cylinder, $2\frac{1}{2}$ kw., \$1,000; two-cylinder, 5 kw., \$1,480; three-cylinder, 8 kw., \$2,100, and four-cylinder, 10 kw., \$2,475.

Fyfe Wilson.—The standard set is a $4\frac{1}{2}$ kw. outfit, a special feature of which is the tubular base in lieu of a cast iron bed-plate. This base consists of four longitudinal tubes formed into a unit by three transverse castings through which the tubes pass. The engine, a 10-hp. four-cylinder, $29/16 \times 45/16$ in. block casting of the light car type, is supported by the upper tubular members, while the generator to which it is connected by a flexible disk coupling rests upon bracket clips on the lower units of the base. A gilled tube car type radiator, with a fan surrounded by cowling and belt-driven from the engine crank-

shaft, is mounted on the forward cast member of the base, while upward extensions of the central member support the cylindrical fuel tank. Gasoline is normally used, and crank starting is depended upon. The engine has hollow shaft lubrication, magneto ignition and thermosyphon water circulation. This outfit without switchboard or battery is offered at \$1,000.

Gardner.—A big range of electric generating sets for house and ship lighting, cinema work, and other purposes, includes a $\frac{1}{2}$ kw. set with a single-cylinder, four-cycle, $1\frac{1}{4}$ hp. engine. This is a medium-speed power unit with water-cooling, and has more features in common with gas engine practice than with automobile engine design. For instance, the valves are operated by eccentrics and coupling rods, the engine speed being controlled by an inertia type governor, acting upon the inlet valve on the hit-and-miss principle. High tension magneto ignition is used, and a splash system of lubrication. In the cylinder head is a scavenging air valve, which operates automatically, admitting air to the cylinder when the inlet valve is closed by the action of the governor.

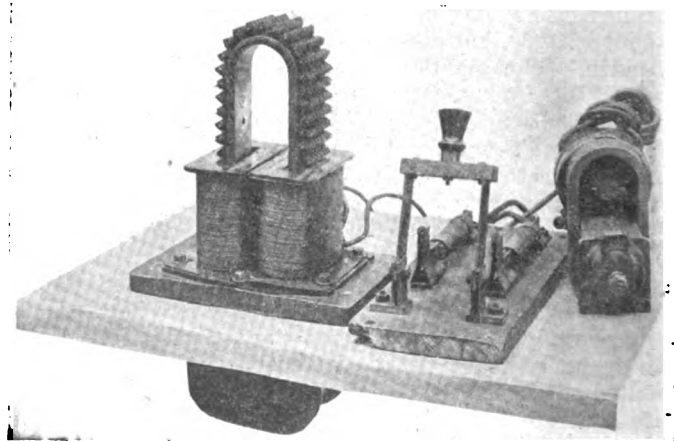
Parsons.—Ship lighting rather than house lighting is the purpose of the electric generating equipments bearing this name. The smallest outfit is a 4 kw., with a single-cylinder $4\frac{1}{2} \times 6$ in. engine running at 900 r.p.m. This is of the four-cycle type with L head, magneto ignition, gear pump for oil circulation and an eccentric water pump. The normal speed is 900 r.p.m., controlled by a centrifugal type governor. Engine and generator are directly coupled, but mounted independently on a cast iron bed-plate, which has bolted to it at the center a vertical channel iron frame supporting the gilled tube radiator and cylindrical fuel tank. A cowled fan driven by a flat belt from a pulley on the crankshaft is arranged behind the radiator, which incidentally has a drip tray beneath it. A heavy cast iron flywheel is fitted, being 22 in. in diameter and having a 4×4 in. solid rim. Kerosene is the normal fuel, starting being by crank, using gasoline. This equipment is sold at \$3,150 without switchboard or battery.

Dixon.—The smallest outfit bearing this name is a $1\frac{1}{2}$ kw. set and sells at \$760, complete with switchboard and battery. It is of the non-automatic type and has a 3 hp. single-cylinder four-cycle $3\frac{1}{2} \times 3\frac{1}{2}$ in. engine, with a normal speed of 1200 r.p.m. The engine has hollow shaft lubrication with a plunger circulating pump. Water-cooling is effected by means of a truck type tubular radiator.

New Magnetizing Outfit

THE greatest difficulty in the assembly and repair of magnetos and electrical instruments is to insure maximum charging of the magnets and to get them into place without losing a large portion of the initial charge. A new equipment for charging permanent magnets has been put on the market by the Esterline Co.

The apparatus consists of the charging coils, a U-shaped keeper and a flexible keeper. After the magnet has been charged it is partially withdrawn from the coils, the U-shaped keeper rising with it. Then the flexible keeper is placed on the outside and the magnet put in position on its frame. Thus the loss in magnetic strength while transferring from the charging coils to the permanent location of the magnet is practically eliminated. We understand that the apparatus has been adopted by manufacturers of magnetos and instruments, and by many repair plants and service stations. The coils are wound on bronze spools, and can be furnished for any commercial direct current voltage.



New magnetizing outfit

Tendencies of British Chassis Design Noted at Olympia

Last week Mr. Bourdon discussed tendencies of British engine design. This week he extends his observations to the chassis. It appears that, to a large extent, the British designer again exhibited his first post-war design, but many details are new and of considerable engineering interest.

By M. W. Bourdon

THE cone type of clutch, either of the internal or external pattern, is by far the most prevalent in British practice, being used in double the number of cases in which the single disk clutch appears. This actually represents an appreciable gain upon last year, a fact which is difficult to understand were it not for the fact that each car manufacturer makes his own clutch and probably finds this type a simpler manufacturing proposition.

Cone clutches are frequently enclosed when they are of the inverted type, as in Humbers, where provision is made for the introduction of a special oil to keep the leather in good condition. Generally, however, a fabric facing is used; in some cases, as in the new Crossley, with supplementary springs under the fabric to ensure a smooth engagement. In the new Phoenix the enclosed cone is of aluminum without facing and runs in oil, an arrangement which this maker has favored in the past and has found to give satisfaction.

The multiplate type of clutch has slightly increased in favor, but instead of running in oil with metallic contact between the plates, it frequently has fabric facings on alternate members. Armstrong-Siddeley provides an example of this design, the plates being exposed and running dry. Wolseley still favors the multiple clutch running in oil, but Lanchester has a single disk instead of the multiplate type of pre-war models.

Clutch pilot bearings in all types of clutches are mostly plain bushes with exterior means of lubrication, but a ball-bearing at this point is occasionally used, as in the new 20-hp. Crossley, while the Bean has a roller bearing. Armstrong-Siddeley with a dry multiplate clutch has a concentric oil chamber around the pilot bearing with a capacity sufficient to provide continuous lubrication for several months' use. The 15-hp. Humber, which has hollow shaft lubrication, has the drilled hole through the rear main journal continued through the pilot, the oil finding its way to the plain bush through the end of the hole, which is plugged with wool to prevent over-oiling.

With unit power plants the clutch is generally connected to the gear-set by a solid shaft or one with merely a flange coupling, but this practice is not universal; Angus Sanderson and Phoenix, for instance, have found a flexible disk coupling joint of advantage in the open clutch pit of the unit power plant. When engine and gear-set are separately mounted, the fabric disk joint, duplicated, is rapidly becoming universal, though Sunbeam and Wolseley are among the exceptions to the general rule, the former having star and block joints, while Wolseley has fabric disk and sliding block types.

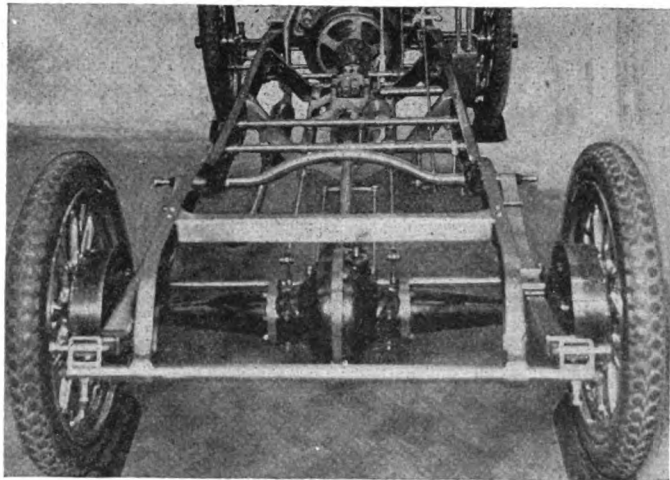
As previously mentioned, gear-sets are, in the major-

ity of cases, separately mounted from the engine, 70 per cent being thus arranged against 20 per cent as a unit with the power plant, the remainder being located as a unit either with the torque tube or back axle. One frequently observed form of support for the separate gear-set is a pair of tubular cross members with three or four point suspension, though there is no uniformity in this respect, and Wolseley, for example, uses one tubular and one pressed steel cross member, while Napier has a single point suspension from a cross member at the front and two-point at the rear from brackets projecting from the side frame members. Apparently the most popular arrangement of any is to suspend the gear-set at three points from two pressed steel cross members, but even so the three-point suspension principle is only partially carried out in the majority of cases and no form of flexible anchorage occurs between the gear-casing and its means of support, so that frame distortion is still to a certain extent communicated to the aluminum box.

The gear-set of the eight-cylinder Leyland is supported at each end by a pilot extension of its casing, these extensions passing through the large central hole of two deep pressed steel cross members of the frame. The inner circumference of each hole is grooved so that with a leather packing ring of square section it constitutes a form of gland in which the gear casing floats, though it is prevented from moving rotationally by two pegs or keys.

Right-hand control for the gear shift lever is still favored, being found on 74 per cent of British cars, though a good proportion of post-war models have the central lever, for example, Armstrong-Siddeley, Austin, Napier, Cubitt and Phoenix, but an equal number have again adopted the right-hand control, which occurs in, among others, the new Crossley. Where the central control lever is used, it is often arranged in a gate, mounted on a sliding shaft instead of being spherically pivoted. This is sometimes accounted for by the fact that the gear-set is too far back in the frame to allow the lever to come through the front floorboards in a convenient position if it were mounted directly on the lid of the gear-set. As a result, a great deal of the manufacturing advantage of the central lever is lost and selector rods are still required. On the other hand, both Austin and Napier, who could, by reason of the position of the gear-set, arrange for a spherical joint for the lever, prefer to give it a sliding shaft and mount it in a gate.

There is no general tendency in one direction or the other as between dog clutches and the internal gear type for the direct drive. Ball bearings very largely predominate for the main shaft, and Wolseley is exceptional in



A British production job (reputed). Rear of 12-hp. chassis. Four-passenger recently dropped \$500 in price; now sells at \$2,600. Four-cylinder integral L-head engine, 2 9/16 x 4 3/4 in.

using Timken rollers; but for the layshaft approximately 70 per cent of cars have plain bushes, and more often than not the shaft itself is a fixture in the casing, while the gear sleeves rotate on it, either with bushes driven into them or upon floating bushes.

There is no general tendency toward the use of ball or roller bearings for the main shaft pilot, but it is rapidly becoming standard practice when a plain bush is used at this point to drill a hole or two holes through the constant mesh pinion between pairs of teeth, so that oil is forced through to the interior bush by the meshing of the two gear wheels.

Propeller Shafts

The Hotchkiss drive—an open propeller shaft, and the torque and drive taken by the rear springs—is used in approximately half the total number of cars. A torque member with an open shaft (as found on the Vauxhall, for instance) is rarely used. The completely enclosed shaft within a torque tube is used in 40 per cent of cases, the remainder embodying a system which is increasing in favor on British industrial vehicles; that is to say, about two-thirds of the propeller shaft is enclosed within a tubular torque member, and an open coupling shaft extends between the gear shaft and the front joint of the propeller shaft proper. While this arrangement seems to have advantages in trucks, where usually the propeller shaft would otherwise be of considerable length and therefore liable to whip, no advantage is apparent in connection with private cars, especially where it results in the propeller shaft itself being decidedly short and therefore prone to submit its joint to considerable angularity. This arrangement is found on the 15-hp. Wolseley and the Ensign Six among others, while Napier affords an example of the Y head torque member with the universal point exposed between it and the gear-set, the front end of the propeller shaft being allowed freedom inside its tubular casing and therefore having a flexible joint at the rear end to connect up to the bevel pinion shaft.

Torque tubes in most cases have the spherical front end forming approximately half the casing of the universal joint, the other half being fixed to the gear-casing, and not infrequently the oil in the latter can penetrate to the joint through the rear ball-bearing. As a rule, some provision is made to prevent the oil leaking back to the rear axle through the torque tube, but there are exceptions, and in one case, that of the new Blackburn, it

is intended that the rear axle lubrication shall be maintained by oil finding its way from the gear-set; and yet no provision appears to be made for preventing the rear axle casing from being over-filled, though drain pipes are arranged at each end to allow any excess to run off. This has the appearance of being a wasteful form of construction without presenting any advantages.

Propeller Shaft Joints

The rapidly increasing popularity of the fabric disk joint for clutch shafts and propeller shafts is a pronounced feature of current tendencies. For propeller shafts it is found in 34 per cent of the cars at either one end or the other; taking open shafts only it occurs at both ends of 28 per cent. Frequently (in the Standard, for instance), no sliding joint is embodied, the flexible disks being called upon to absorb variations in axle position relative to the gear-set, due to spring movement, and having their star bosses pinned and brazed to the shaft ends.

Next to disk joints, the plain bearing star or ring type is the most popular, while ball bearings are used for this type of joint in eight cars and roller bearings in two others. The sliding block joint, sometimes known as the De Dion type, and consisting of square blocks able to slide in grooves in the casing and to rotate on the T ends of the shaft, are also popular, being used usually in conjunction with a star joint at the opposite end of an open shaft.

The flexible disk joint has, of course, overcome the need for giving thought as to means of lubrication, but where one form or other of metal joint is used there is far more evidence than in the past of an endeavor to lubricate it automatically or semi-automatically.

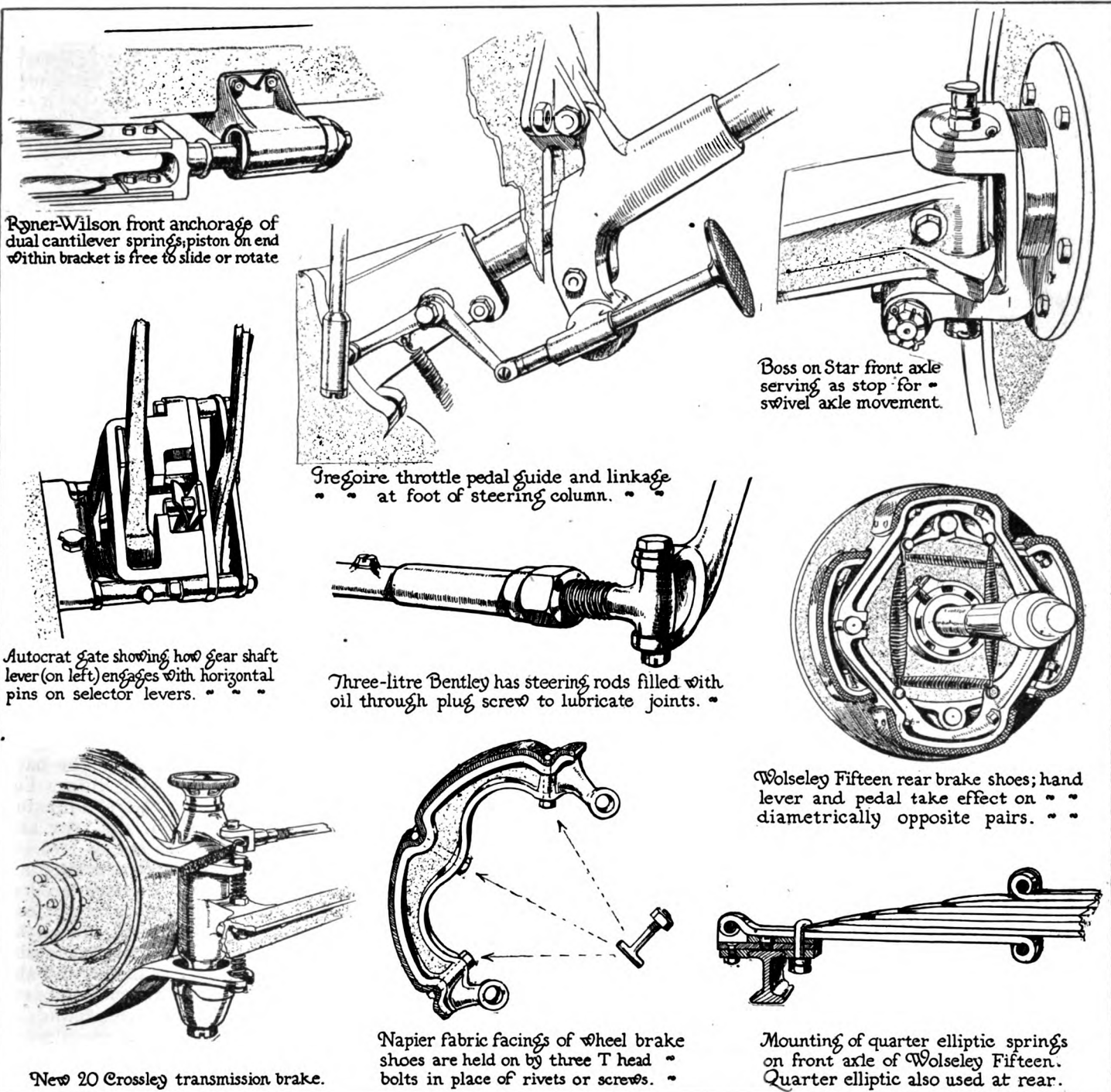
As already mentioned, front joint housings are frequently in communication with the lubricant in the gear-box when a torque tube is used, but this is also the case in one or two instances with an open shaft. In the Sizaire Berwick, for example, which has a block joint at each end of an open shaft, these joints are supplied with oil from the gear-set and back axle respectively. When lubricant, either oil or grease, must be introduced by hand, it is becoming general to arrange for its introduction at a point where centrifugal force will have the effect of carrying it to the bearing surfaces instead of away from them. Napier has this arrangement with star joints, the pins of the latter having blind bushes so that the lubricant cannot escape at the outer ends.

Rear Axles

Every imaginable combination of aluminum, cast steel and pressed steel is visible in rear axle construction, the only marked tendency being to adopt aluminum for the central portion; there are only isolated examples in new cars with unfamiliar names having tubular extensions integral with the aluminum center, and these have flanged ends with bolted-on cast steel final extensions to carry the springs, bracket anchorages and wheel bearings. Nor is any tendency evident in favor of full, half or non-floating axles; they are all represented on all types and sizes of cars.

Final Drive

As might be expected, the spiral bevel has gained a lot of ground from both the worm and the straight bevel, though there are several of the largest and best-known makers still retaining one or other of these earlier types. Among the high-grade cars, Lanchester, Daimler and Wolseley, adhere to the worm, the first two still using the Lanchester hour-glass type, but Rolls-Royce maintains the straight bevel, and Napier, Ensign, Guy and



Armstrong-Siddeley have spiral bevel. The respective percentages of these drives are, approximately, 43 per cent spiral bevel, 25 per cent worm and 26 per cent straight bevel, the balance being concerned with the smaller types of runabouts, which mostly have roller chain drive, usually with a friction transmission.

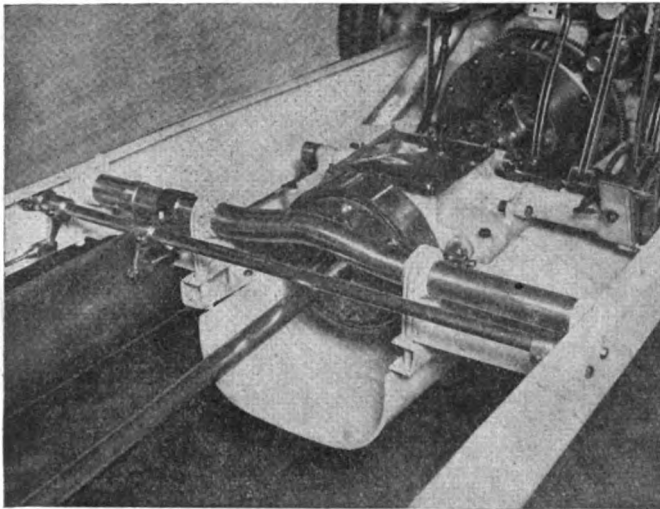
Brakes

There has been something of a "landslide" in connection with brake location, for the current tendency is to relegate both sets to the rear wheels; but it is distinctly the exception to find an external band brake on the rear wheel drums, the usual arrangement being two pairs of expanding shoes side by side. Exceptions to this occur in well-known cars; for instance, Rolls-Royce has concentric shoes in the drums, Wolseley has, on two models, four segmental shoes in the same plane, the two pairs of opposite segments being actuated by hand lever and

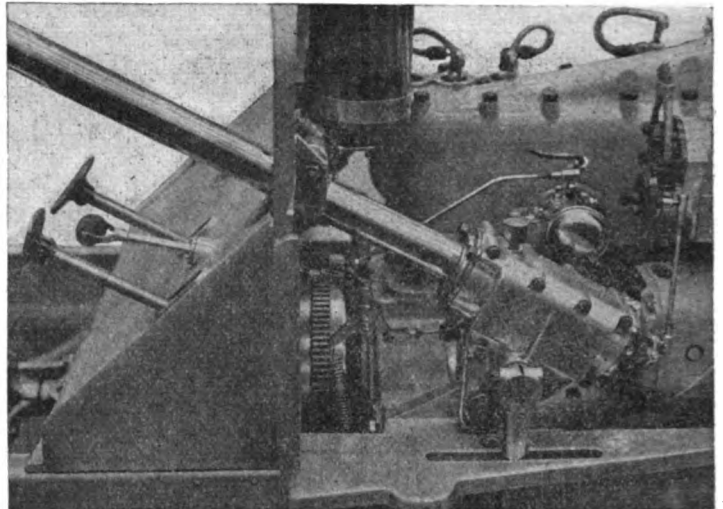
pedal respectively. On the other hand, Daimler still persists in maintaining a band brake on the rear wheel drums, this being operated by pedal, while an external transmission brake behind the gear-set is applied by the lever.

Where both brakes are used on the wheels, 90 per cent are internal. Comparing the use of two sets of wheel brakes with that of one transmission brake and one set on the wheels, the percentages are 61 and 39, which represents a considerable gain for the former, as until last year it was cause for remark when a British car was observed with both brakes on the wheels.

In connection with brake connections, there is a tendency to return to the use of steel wire cables in place of rods. Austin uses them and this lead (if it may be so termed) has been followed in a number of small cars. It appears, however, that in some cases cables appear to have been adopted to help out the designer from some



Rear suspension of Humber Fifteen sub-frame for engine (3 1/4 x 5 1/2) and four-speed gear-set



H. E. adjustable brake steering column. Gear housing mounted on bracket on aluminum base plate of hood

difficulty, rather than because they are better in service, more economical in production or more direct in application than rods.

Wheels

Wood wheels may be said to have practically disappeared from British cars, though one of the makers with the biggest output, Austin, still retains them. The pressed steel hollow-spoked type is used in approximately 50 per cent of cases, though the wire-spoke pattern is holding its own in really high-grade cars; the disk wheel with single plate is gaining rapidly, though it has been dropped by those firms who took it up tentatively and whose rear axles have straight bevel drive, for it was soon found that the disks acted as sounding boards to the hum of the gears. Riley, who at one time supplied a lot of wire wheels to the trade, is now making a laminated disk type with three plates attached to the hub and only the largest one to the rim.

Rudge-Whitworth and Dunlop continue to hold the field in wire wheels, but Sankey, who originally had matters all his own way with the pressed steel type, has now a serious competitor in Goodyear.

No British car maker has yet standardized detachable flange rims and straight-side tires, though many tire makers are able to supply the latter as well as the clincher variety (beaded edge), but mainly—if not entirely up till now—for replacements on American cars. A rumor that Rolls-Royce will standardize straight side tires is neither confirmed nor denied when the question is put.

Springs

While a year ago a sudden increase in the popularity of cantilever type of spring was noted, the majority of new makers have adopted some other form. Several manufacturers who adopted cantilevers in a hurry for their post-war models have realized that a good suspension is not necessarily obtained merely by utilizing one system of springing or another. There has been a certain amount of trouble with the application of the cantilever system, this being principally concerned with rolling and excessive rebound. These troubles have been overcome to a certain extent in some cases by increasing the number of leaves, though, strangely enough, Rolls-Royce has gone in the other direction, and the latest model has only six leaves 2 1/2 in. wide; five of these are 3/8 in. thick and

one, the main leaf, 1/2 in. in thickness. Yet Rolls-Royce has 14 leaves in the front semi-elliptics, the two longest being 5/16 in. thick and the others 1/4 in.

A type of spring which is increasing in favor and has advantages from the manufacturing point of view is the quarter elliptic. This has been adopted by Wolseley for two models, and provides an exceedingly good suspension. An advantage from the user's point of view is that this system can be adopted so as to eliminate all bearing surfaces requiring lubrication, for the butt ends are secured to the frame side members and the other ends to the axle.

Actually, quarter elliptic springs are used at the back of 18 per cent of cars, a percentage which differs but slightly from that of full cantilevers. Arrrol-Johnston has discarded the full elliptic spring for the rear and adopted the three-quarter elliptic. With one or two exceptions there are no peculiarly distinctive spring arrangements, though the Ryner Wilson, a newcomer, has duplicated cantilevers at each side, drop forgings at one unit of each pair arranged above the other, united by forked front and rear and having the ends secured to pistons, one free to rotate and slide in a cylinder and the other able to rotate only. The same arrangement occurs at the front of the car, where semi-elliptics are found.

Steering

Current tendency in regard to steering gears is to use the worm and complete worm wheel arrangement, the use of the worm and nut or worm and segment being exceptional. It is infrequent to find any provision for taking up axial play of the worm wheel shaft. The tendency, at one time observed, to fit ball thrust bearings to the worm shaft has died away, and plain thrust rings with some form of adjustment are usually preferred where any adjustment at all is provided.

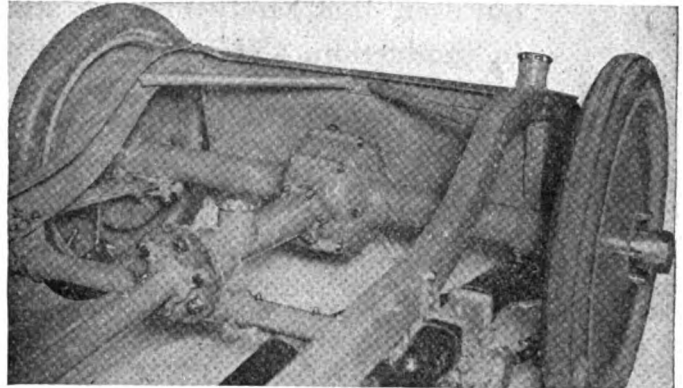
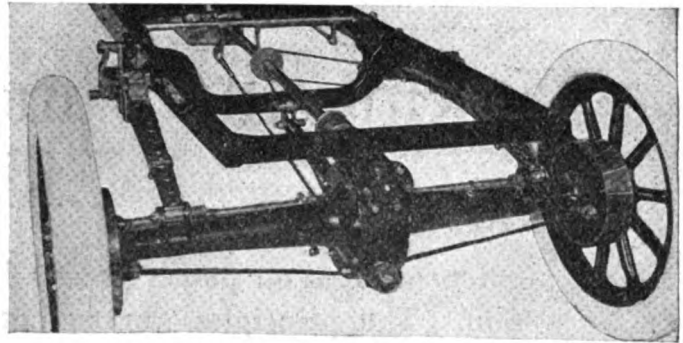
The use of disk wheels has encouraged a few makers to adopt central steering pivots. Armstrong-Siddeley and Riley (the latter a light car of good reputation but small output) have their steering pivots vertical immediately over the point of tire contact with the ground, and there is no question but that these two cars have the lightest and most free-from-shock steering equipments of British cars. True, they present but little improvement over those cars in which the axes of the inclined pivots produced coincide with wheel contact, but in the writer's opinion there is some advantage, small though it may be,

when serious inequalities of the road or obstructions are encountered by the wheels. The majority of the cars, however, have vertical pivots, though the wheels are usually slightly splayed by the pivot pin being set slightly from the horizontal.

Electrical Equipment

The two-unit system for lighting and starting is fitted on the vast majority of British cars, and the single unit is a standard type with only one or two makers of electric outfits, Lucas being the principal representative. The Bendix drive for the starter is general, though Lucas still has the magnetic engagement in his two-unit system. Where the electrical equipment of so many British cars fall short is in the drive of the generator, which in 80 per cent of cases is by a V-belt instead of directly.

Twelve-volt equipments are still in the majority, though there is a tendency to adopt the six volt set on the recommendation of the electrical firms. The latter are also recommending ground return wiring, but this is met with only in isolated cases. In connection with electrical equipment generally, the writer ventures to prophesy that within twelve months there will be found a pronounced movement toward ground return wiring, 6 volts, direct driven generators and small head lamps secured to the front fenders, eliminating side lights and head lamps of large dimensions. The reason for the last mentioned forecast is the probability of lighting restrictions of a somewhat drastic nature being imposed next year by the Ministry of Transport, which will render large head-lamps illegal and tend to induce economy in lamp equipment by encouraging a cross between side lamps and head lamps mounted on the fenders in order to comply with a continuance of the regulation which insists upon at least one pair of lamps indicating the full width of the car.



Top—Method of resisting torque when cantilever springs are used with an open propeller shaft and worm drive; lug on axle center has tubular extension under propeller shaft linked to cross member. New British light car, the Wilton. Bottom—Short semi-enclosed propeller shaft of new Seabrook "sports" car. Torque tube pivots on tubular member that forms trunnions for cantilever springs. Note axle oil filler on torque tube

Cylinder Reaming Set

A NEW cylinder reaming set has been added to the reamer line of the Wetmore Reamer Co.

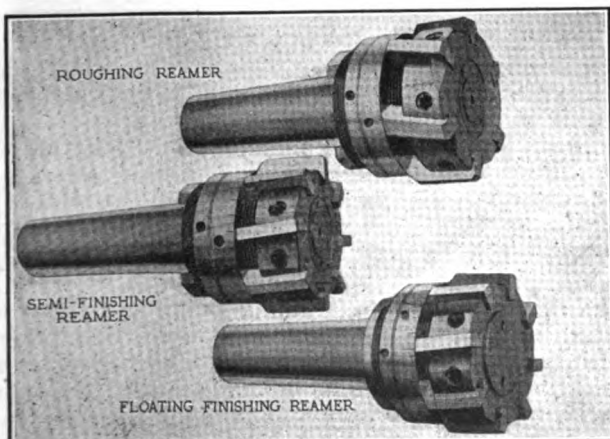
The roughing reamer is of heavy construction with adjustable and replaceable blades set at a right hand angle. The semi-finishing tool has left hand angle blades and it is claimed that it will produce a smooth round hole when backing out. A modification of this reamer is designed for line and pilot reaming. The floating finishing reamer has the float in the head of the tool directly under the strain, a feature which eliminates the tendency to get out of parallel or cramp. The float is an improved Oldham type having rollers instead of sliding contacts. The float

mechanism is protected from dust and grit by a cap covering the front and a washer protecting the back. The blades of this reamer are set at a left hand angle and staggered. Expansion and adjustment to thousandths of an inch are accomplished by means of a graduated micrometer lock nut located at the rear of the blades. Present standard sizes are 2 7/16 in. to 5 9/16 in.

A Protector for Twist Drills

IT is said that 90 per cent of small drill breakage in production work occurs just as the drill breaks through the under-surface of the article being drilled. When the drill point approaches the under-surface of the work, the resistance of the material rapidly breaks down, and unless the operator carefully feels his way through, the drill moves forward faster than the cutting edges can remove the metal, acting more like a screw than a twist drill. If the drill is small and the metal tough, the drill is almost certain to break.

A device designed to prevent such breakage has been placed on the market under the name of the Martian Drill Protector. It comes into action just when the drill is about to pierce the under-surface and is claimed to prevent it from feeding too fast. When the protector is properly set, the operator can detect no change in the "feel" of the press, and the resistance is shifted to the mechanism of the protector. This device is manufactured by the F. S. Machine Specialties, Inc.



Cylinder reaming set

Making the Punch Press Safe and Efficient

Safety devices on punch presses have usually meant decreased production. The principles worked out in a large Western concern prove, however, that safety may be attained together with a decided increase in production. This article tells how these results were accomplished.

By Norman G. Shidle

THE punch press has probably recorded more industrial accidents than any other single type of machine. Between its powerful jaws innumerable hands and fingers have been paid as toll to increased production. The safety movement, so successful in many other parts of industry, seems to have made less progress in the field of punch presses than elsewhere; that is, it has seemed very difficult to render these important machines safe for the operator and at the same time capable of efficient production.

But it can be done. And as in many other cases, a detailed explanation of the method brings surprise rather because of its simplicity than because of its complexity. A. L. Kaems, safety engineer of the Simmons Co., has proved to his own satisfaction and to the satisfaction of many others that practically every punch press operation can be so arranged that the operator need not put his hands between the jaws of the press at any time, and that this arrangement can be such that production will be increased rather than decreased.

His theory is that the piece should be pushed or slid into the die, instead of being placed there by the operator. To understand how this principle may be carried out in practice, an examination of the work done along these lines at the Simmons Co. will be of value.

Every operation or die requires a separate and specific device. No general safety device or production help can be arranged that will be suitable for every operation, although the device for several operations may be very similar. Consequently, the proper equipment of all the dies in a plant of any size is the work of several years and cannot be accomplished without a great deal of time and effort. The results possible, however, as shown by the work at this plant, fully justify all the time and the small expense necessary.

The difficulty of devising a means of sliding or pushing the piece into the die will, of course, differ very greatly with various dies. Some adapt themselves readily to this method, while others cannot be adapted without the exercise of considerable ingenuity and experiment. Problems of every kind have been met with in the work of this plant, and practically all of them have been solved.

Fig. 1, for instance, shows an operation in which the piece is simply slid in by the operator. This die was originally constructed exactly opposite to the way it is shown in the photograph; that is, the round part lay at the end farthest from the operator. It was found that by turning it around and cutting away a part of the die, the piece could be slid in, since the round part is larger than the straight piece and will not go through the space in the die allowed for the latter. A small guard stops the operator's hand from slipping too far when sliding in the piece, and

the piece is kicked out automatically after the operation is completed. Consequently the operator's production is limited only by the speed with which he is able to slide the piece in and trip the press. He is never required to place his hand between the jaws. Production on this job was increased about 55 per cent after the introduction of this device.

Another case in which a change in the die was necessary to insure safety is shown in Fig. 2. Standing beside the press on the table is shown the die with the piece placed on it as they appeared before the operation was studied and changed; that is, the die was located in the bottom of the press and it was necessary for the operator to reach in to place the disk on the pin.

To allow the disk to be slid in, the part of the die referred to was placed in the top of the press and the forming die changed to the bottom. A slide was then attached to the forming die. The operator now merely slides the disk in and trips the press, while the disk is automatically ejected from the forming die. This job was rather dangerous; the present method is obviously safe. And under the present method production averages 37 per cent higher than before.

In each of the cases described, it will be noted, the press was tilted to allow for sliding. In some cases, however, this is not feasible. Fig. 3, for example, illustrates another forming job on which the press was not tilted. In this case, a slide was made separately and so adjusted that the piece falls from the slide accurately into the die. The short stroke does not allow for automatic ejection of the piece, so the operator knocks the piece out with a stick. When the operator used to do this job by placing the piece in the die, production was 26 per cent lower than at the present time.

The operation illustrated in Fig. 4 is similar to that shown in Fig. 3, except that the stroke of the press is long enough to allow for automatic ejection of the finished piece. The operator merely slides the piece in and trips the press. By this method an increase in production of nearly 50 per cent was achieved.

When the operation is such that the finished piece can pass through the die, one problem is, of course, eliminated—that of removing the piece from the die. Fig. 5 shows such an operation. Again the piece is slid into the die, the operator's hands never coming near the danger zone. The finished piece passes through the die. When the operator placed his hands under the jaws to insert the piece, production was about 100 per cent less than at the present time.

Another type of job is shown in Fig. 6. This is a re-drawing operation in which the operator was formerly

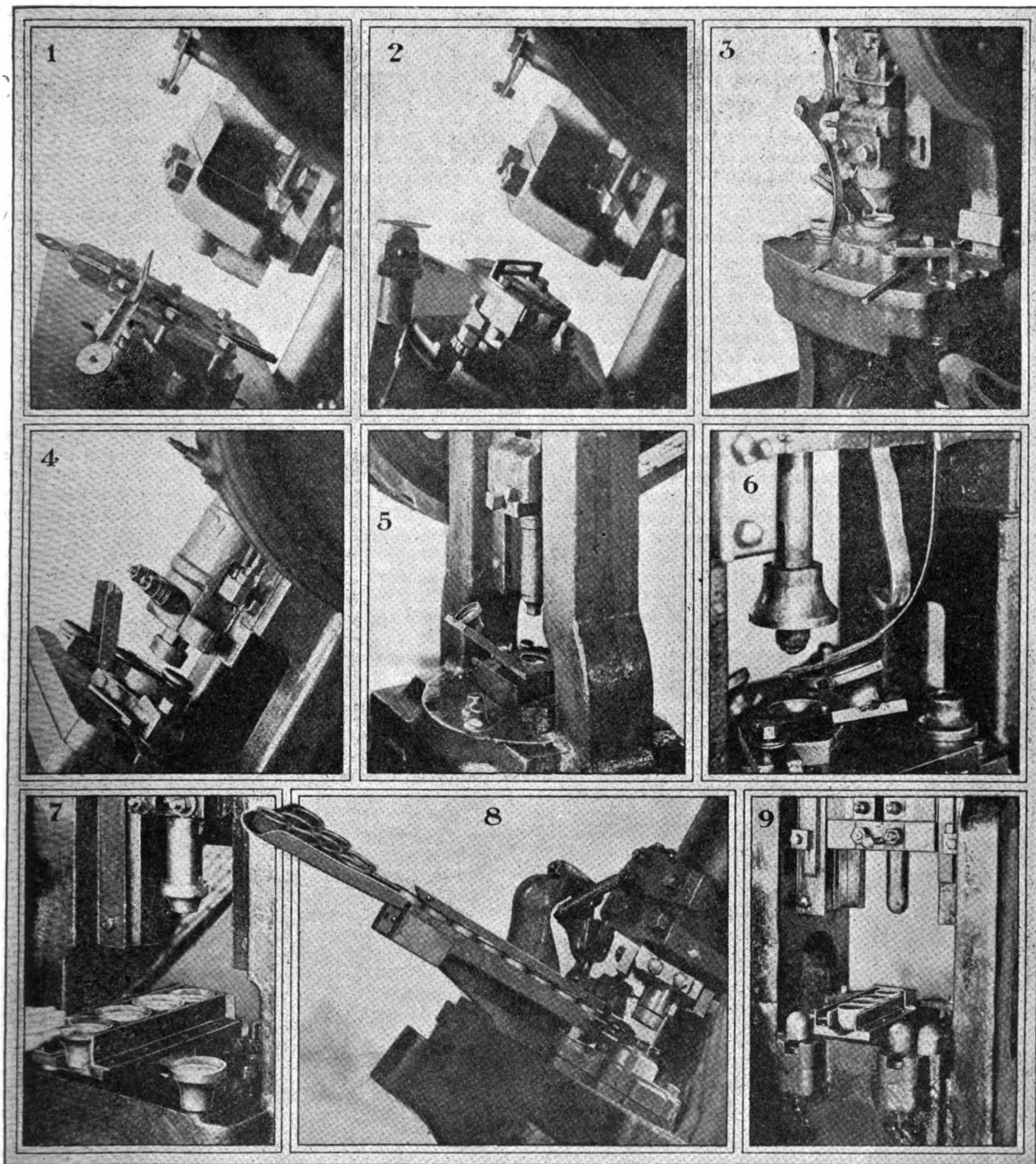


Fig. 1—Sliding work into die; die was reversed to allow this method. Fig. 2—Another operation on which die was reversed to allow for sliding in of work. Fig. 3—Work is knocked out with a stick, because stroke of press is too short to permit automatic ejection. Work drops from slide into die. Fig. 4—Type of slide similar to Fig. 3. Automatic ejection possible. Fig. 5—Work passes through die, so ejection problem is minimized. Fig. 6—Redrawing operation which required considerable experiment and study. Fig. 7—Work is pushed through die. Fig. 8—An automatic feed. Fig. 9—How a difficult problem was worked out. Pieces rounded on end are held in vertical position and pushed under die

compelled to place the piece in the die underneath a stripper located over the die. It was necessary to remove the piece in the same manner.

In attempting to remedy this unsafe condition, the stripper was taken from its position and placed on the ram.

This did not work successfully, however, so a piece of spring steel was fastened to the side of the press by a brace. This was successful in that when the piece stripped it struck this spring steel as it descended. The spring steel, however, had to be gotten out of the way of the de-

scending ram. To accomplish this an extra piece was fastened to the cross-head. This extra piece pushes the spring steel out of the way, so that it clears the ram.

A slide was constructed by means of which the piece is slid into the die. It is then automatically thrown out, as shown in the illustration. This new method showed a production increase of 150 per cent.

Another re-drawing operation is shown in Fig. 7. It is possible in this case to push the work through the die, and the operation has been so arranged that the operator's hand need not come nearer than 21 in. to the jaws of the press. The production increase on this job was 50 per cent.

An automatic feed was arranged for the trimming job shown in Fig. 8. Here the operator needs only to place a number of pieces in the holder at the top of the slide and the pieces then fall automatically into place. Before this method was worked out the operator was compelled to place each piece in the die by hand. The new method resulted in a production increase of about 125 per cent.

The last photograph, Fig. 9, shows how a particularly difficult operation was worked out in the interest of both safety and production. The job is a re-drawing operation and the work can readily be pushed through the die. The difficulty arises in the fact that the pieces are round on the bottom, so that they will not, of course, stand up straight in an ordinary tray provided for them. To overcome this difficulty, a tray with a rounded bottom was made. Then an extra piece was placed along one side, and tension springs placed between this piece and the wall of the tray. This device held up the heads of the cups and permitted them to be pushed into the die in the proper position. In this case, the new method resulted in an increased production of 66 per cent.

In all these cases where the piece falls from a slide into the die, it is evident that the slide must be inclined at exactly the proper angle to insure the die falling accurately into place. This, of course, means experiment and adjustment, as does a study and readjustment of the dies, and the actual making of the various devices. The devices in themselves are simple, but cannot be prepared without some careful work. The expense involved, however, is slight in comparison with the safety achieved and the production increase. To do this work at the Simmons Co., three skilled mechanics are provided to assist the safety engineer. These men should have the same requisites as a tool maker or die maker, but need in addition imagination and the ability to do constructive work.

Men who have long been used to working from blue-prints may be found to be psychologically incapable of original work of this kind. These various devices can be worked out only by experiment and imagination. Consequently, the mental attitude of the mechanics assisting the safety man will be an important factor in working out the principles laid down.

Automatic Feeds in Future

Would not such devices as the dial feed be more efficient in many cases than some of the devices described here? This question will doubtless arise. Mr. Kaems answers by saying that there is no question but that in the future automatic and semi-automatic feeds will be developed and applied almost universally; that even now such devices as the dial feed are in many cases superior to the temporary devices of the type described. On the other hand, he points out, a great deal of expense is involved in the installation of the dial feed, for instance, and for that reason these more permanent devices cannot be universally installed at once.

Much of this work, Mr. Kaems feels, is what might be called "first aid" work. Unless something is done immediately hands and fingers will continue to be lost. Such

devices as are described in this article can be installed at a cost that is extremely small, and with a minimum amount of adjustment of the machine.

Reduced production has nearly always accompanied the installation of safety devices on punch presses, and for that reason many manufacturers have hesitated to put them in. Moreover, when such a safety device was put on a press and the piece rate for the operation not increased, the operator usually found that his earnings were reduced. This fact tended to make him adjust the safety device so that it would be ineffective. Both of these difficulties are eliminated in the application of the principle discussed in this article. It is for that reason that the attempt to push or slide the piece into the die in every case is worth investigation and study.

Fear Removed; Production Increased

It is easy to understand how production has been increased in each of the illustrative operations described. The movements of the operator were shortened in most cases, while additional speed was rendered possible by the removing of the fear of injury. That is, where injury is practically impossible, the operator can work with his mind concentrated entirely upon production.

Spoiled work has also been reduced on the operations where these safety principles have been applied. This is accomplished because when the pieces are slid into the die each piece goes in from exactly the same angle, while no man, however skilled or steady, can keep his movements exactly the same over a long period of time.

There are about 3000 different dies in this plant, and during the ten or eleven months that this safety work has been going on about one-third of them have been studied and properly equipped with safety devices of the type described.

Emphasis has been laid thus far upon the production value of these devices, but the real value in saving fingers and hands must be considered as of primary importance. Before this work was begun at the Simmons Co. about the beginning of 1920, accidents were far more frequent than they now are. During 1919 there were 500 per cent more fingers lost than during 1920, since these new principles were worked out.

And it is interesting to note that of the few accidents that have occurred this year, every one has been due to some forbidden act upon the part of the operator. Every accident this year has been of the kind that might have occurred as easily on any other machine as on a punch press.

The problem of punch press safety is vitally concerned with the design of the die and the set up of the machine. Engineers and designers who have in mind the safety problem when laying out dies and setting up machines can do fully as much toward rendering the punch press a safe machine as can the safety engineer. A fuller co-operation between these two executives would be likely to yield excellent results in bettering the situation.

Because each individual die and operation presents its own peculiar problem, it must be the responsibility of the user of the press to provide adequate safety devices. The manufacturer of the press could, at best, provide the press with some type of general all-purpose safety guard, which would be likely to reduce production and thus cause dissatisfaction both to the owner and the operator. A careful study of individual dies, however, such as described, will make it possible to render the punch press not only safer to operate but more efficient in production.

To gain the benefit of such studies and installations as those described, attention must be concentrated upon the human as well as the mechanical side. The human ele-

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Practical Benefits of Truck Body Standardization

It is evident that the truck needs all of the aids in merchandising that can be given to it. There is no better opportunity than through the providing of better and cheaper bodies. This review, by a practical body student, points to various advantages to be gained by standardization.

By Harold F. Blanchard

THERE is a pressing need for motor truck body standardization. While there will always be a certain demand for special bodies of various types, the fact is that the big bulk of motor truck users can be served by just a few types built in a few sizes. Half a dozen different types built in about as many sizes would cover the field with surprising effectiveness.

The benefits accruing from standardization are manifold and are rather equally divided between manufacturer, dealer and user. However, it is not until a careful study of the advantages to be gained by all three is made that the full possibilities of the idea are honestly appreciated.

Briefly the benefits are:

- 1—Better bodies.
- 2—Cheaper bodies.
- 3—More truck sales.
- 4—Quicker truck sales.
- 5—More profit for dealer.
- 6—Less dealer capital involved.
- 7—Better satisfied customers.

Difficulties in the way of realizing this ideal are:

- 1—Lack of chassis standardization.
- 2—Lack of co-operation between manufacturers, dealers and their salesmen to encourage purchase of standardized bodies.
- 3—Transportation of bodies which are usually bulky; possibility of damage by the railroads; expense of crating.

Since some may object to the idea that better bodies would result from standardization it should be explained at once that every now and then a user requires a body different from any possible standard which might be selected. Yet the bulk of users would find the standard types satisfactory. Some who think that they require special types would learn by experience that standard types would suit them just as well, if not better. The demand for infinite variety is based as much on prejudice as it is on practical experience.

Before proceeding with the discussion, let us review briefly what has been done to date. A few truck makers are supplying their models complete with bodies, including one builder of large trucks. In most cases, however, the body problem is up to the dealer. Dealing with a custom builder has its drawbacks:

His prices are high or his work is poor, and the dealer must wait several weeks for delivery. In general, however, dealers purchasing better class bodies prefer the custom builder to the stock body manufacturer.

The objections raised against the latter are:

Bodies are deficient in appearance and construction; types offered are not the ones in demand in the territory. Many, in fact most, of the difficulties now confronting the stock body manufacturer would disappear with chassis standardization.

With this brief sketch of the situation as it stands let us return to a consideration of the benefits that are to be obtained by standardization.

Such bodies would be better in many ways. They would be lighter, stronger, more durable, of uniform construction and quality and in most cases their dimensions would be more satisfactory than they are under the present system.

It is to be expected that if the demands of the country could be satisfied largely by a few types that great advances might be made in the design of these bodies from an engineering standpoint. The van body built some time ago by the Goodyear Tire & Rubber Co. for its overland service, weighing half as much as the usual design, is eloquent testimony on this point. It is certain that much weight could be lopped off of present types by a better knowledge of the principles involved.

If a body design that now weighs a ton can be revamped so that its weight is half a ton, the saving can be put into ½-ton increased truck capacity or the size of the truck can be reduced just that much. It is difficult to say exactly just how much can be accomplished in this way, but really nothing has been done to date. Progress in the art of body building since the advent of the motor truck would be hard to find with a microscope. The builders of bodies, small and large, have blindly followed horse tradition.

This lack of progress is largely due to the fact that truck manufacturers have dodged the body problem. They have been content to furnish the chassis and let it go at that. The chassis is one thing and the body is another, and the two are bolted together. It is not so certain but that there is great opportunity for improvement by a closer relationship between the two units. Specific suggestions along this line are useless for it is too big a problem for one man to solve; it is a problem for the truck industry as a whole. However, it does not seem improbable that changes in the truck frame will eventually be evolved so that it will offer a more satisfactory support for the truck floor with the elimination of stringers and cross-pieces, or some sort of a compromise where the construction of the body foundation is simplified and weight is reduced without loss of strength.

However, regardless of the trend that truck body de-

sign does take, the fact remains that there is a great need for the study of body designs by the best engineers in the country. Progress cannot be made as long as the bulk of the body business is in the hands of local body builders and it cannot be expected that this condition will change until the conditions hampering the sale of stock bodies are removed. Therefore, improvement in body design hinges on the removal of these adverse conditions, and this can only be accomplished by the closest co-operation between truck manufacturers, truck dealer and body manufacturer.

Progress in body construction cannot be expected from the local body builder because he is hampered by tradition and has not the technical training to advance even though he wanted to. The stock body manufacturers, on the other hand, have instituted some noteworthy improvements. But even they hesitate to make more than detail changes in body construction. Considering the present state of the industry, to cast aside standard practice and begin all over again from the ground up would be fatal. There would be too much sales resistance to overcome both among dealers and users. Strangely, they are not in the same boat as the truck or the passenger car manufacturers. From time to time these have completely revamped their designs, the new product selling largely on their reputation as manufacturers of successful automotive equipment.

Only when the stock body manufacturers are sufficiently powerful, and possess the confidence and gain the co-operation of truck manufacturer and dealer can progress be expected. And then only when the hampering conditions now governing the body business are largely removed, and when these companies are in a position to hire and make full use of the best engineering brains to solve both design and production problems.

However, even though there are no radical improvements made in bodies, the general use of standardized bodies will bring with it a decidedly improved product. Better bodies must be the total result. This applies to custom built bodies, although some will maintain the contrary. It is admitted that many custom bodies are about as good as they can be. But even the best of these bodies, constructed with the most conscientious care, are deficient in some particulars.

These bodies are built according to the experience of the builder and few there are that would pass uncriticized under the inspection of a competent engineer. The body may be sufficiently strong, and the materials and the workmanship may be just right. But even so, it is almost certain that the body builder, being a practical man who is following custom, has gone to more expense in working out certain details than is necessary. It is almost certain that iron will be found where it does no good, even though it may do no harm. Wasted effort is apparent in the construction of almost all good bodies. This naturally adds to the price.

But not all custom bodies are well built. The average truck dealer is in the market for a pretty good body at a medium price. The cost of his truck and the character of his trade makes this necessary. These builders turn out a great deal of work that is not satisfactory and this matter is a very tender spot among the truck dealers.

In general the methods and equipment of these builders are very crude. Often they have no wood-working machinery beyond a band saw and a couple of circular saws. Mortises, stake pocket sockets and similar work must be done by hand. This takes time and in their hurry the workmanship is usually poor.

It is common practice to fit a stake or upright so loosely in its hole, either through carelessness or inten-

tion, that it is necessary to drive in wedges to take out the play.

Naturally, bodies that are loosely fitted together soon become wobbly, moisture gets in between the joints and rotting of the wood adds to the difficulty. The net result is a body with greatly shortened life.

However, the greatest difficulty the dealer has with the average body builder is to get just what he specifies and here is where his salvation lies in the development of the stock body industry, inasmuch as what he wants is already built and waiting for him; he can look at it and tell in a moment whether it fills the bill or not. When a dealer orders a body for a customer he is buying a pig in a poke. He gives the body builder brief specifications of what he wants; the body builder says, "Yes, I know," and starts in sawing up his lumber probably without the formality of making even a rough sketch. The body is sawed out and assembled stick by stick and piece by piece.

This is wasteful and primitive. Much slower than milling all the wood to predetermined dimensions and assembling it. Furthermore, it has the added disadvantage that mistakes are frequent. Pieces are made too short and too long entailing waste of good lumber or patching, and the latter is much more frequent than a glance at the finished job would indicate. Sawcuts are made too deep and are filled with putty.

The general result of this situation is that unless the dealer finds one body builder who is satisfactory and sticks to him, he is never certain of how suitable the body he orders will be. Dimensions of slats, uprights, flooring, etc., may be wrong. The workmanship may be crude in spots or wholly. Various details of the body may differ from standard practice and therefore be unsatisfactory. The body may lack appearance, grace of line. Screws may have been used where bolts were expected. Bolts and screws may be the wrong size. There are myriad ways that a body may be unsatisfactory.

The cost of truck bodies is much greater than it should be, and this statement applies particularly to custom built jobs.

What can be accomplished in this line is strikingly illustrated by the low prices of some types of bodies that are built in large quantities according to modern production methods. For example, a certain Western body manufacturer makes a rack body for a one-ton truck that is sold in rather large quantities. It is a well constructed body yet it retails for the low sum of \$125. The same body, reproduced in all its details, would cost \$300 if built by the average local body builder.

The cost of the lumber in this body is about \$10, that is, if the lumber is purchased in quantity, although the cost to the local builder would probably be \$30 or more. Ironing of the body is a modest figure in the case of the quantity manufacturer and a very large figure in the case of the local builder.

So the quantity manufacturer because of his greater purchasing power obtains his iron and his lumber at a comparatively low figure but after all the largest part of the saving of the difference between \$300 and \$125 is to be found in the difference in labor. The custom body man makes his body in hand to mouth fashion. He saws out a stick and puts it in place, then he saws out another stick and puts that in place and so on until the body is completed. The time spent in walking from lumber pile to saw to body is in itself a large figure. The word saw is used advisedly as many of them have no other equipment beyond two or three power saws.

Low body prices are largely confined at the present time to the smaller types which are produced in large

quantities. The stock bodies for the larger trucks are not very much lower than the prices for similar custom jobs for the reason that these bodies are not turned out in sufficient quantity. Their main selling point therefore is: Immediate delivery.

Often the sale of a truck hinges on how quickly delivery can be made, the delivery of the truck complete with body ready for service; the chassis by itself is no use.

Sometimes a truck prospect will hesitate a long while about buying a truck, yet when he is actually brought to the closing point he wants the truck immediately; in 24 hours, perhaps. In many cases there is good reason for his hurry; he has new business which must be taken care of at once; or the truck he has been running, which has about served its usefulness, has broken down. At any rate he wants a new truck at once. Consequently, he is very likely to buy from the dealer who can make the quickest delivery.

If the dealer has a suitable body in stock or if there is a stock body representative in town with a suitable body the solution is easy.

Many times where the stock bodies available are not the type desired the purchaser, of urgent need, will take a stock body that he really does not want. A better stock body selection would greatly help this condition.

The main reason, however, for expecting a general increase in sales as a result of a reasonably complete standardization of truck bodies, lies in the fact that the bodies could be made and sold much cheaper than now. There is no doubt but that a good, husky body for a three-ton truck which now brings, say \$500, could be made and sold at a profit at \$250 if production methods were used, and the lower price would increase sales.

If the use of specially built bodies were the exception rather than the rule, the dealer would benefit not only by increased sales because of the lower prices at which production bodies can be sold but in many other ways.

He would make a profit on the sale of the body; this profit he does not now realize in a great many instances. He does not obtain this profit unless he handles the body and in many cases he refuses to assume this burden for the many reasons already detailed. If he does handle the body he may not obtain a profit because in many instances the local body builder and the stock body representative are both only too willing to sell the truck purchaser at the same discount that is allowed the dealer, and the customer usually knows this.

If truck body demand, by general standardization, were focused on a few types, satisfactory in style and quality, the dealer could afford to carry stock bodies buying direct from the manufacturer, and eliminating the profit of the local representative. The profit which he would make, while attractive, would not seriously detract from the saving effected by building such bodies in quantity.

If standardization were carried out with proper completeness it is really doubtful whether the dealer would require any additional capital to carry the bodies he would need to have in stock.

And if there were local stock body representatives and their wares were such that the dealer could look to them in nine out of ten truck sales, the capital he would require would be much less than is now needed, the reason being the length of time his money would be invested in a truck would be much shorter than it is now. At the

present time in the average case the dealer's investment does not end when the customer says he is ready to buy. The body is still to be built before the truck can be delivered. This usually takes three weeks and sometimes requires six weeks or more. All this time the dealer's money is lying idle in the truck. This is one reason why some dealers refuse to have anything to do with the body problem.

The worst of it is that it is difficult to depend on the promise of the local body builder. If he is rushed with work he may promise to finish the body in two weeks and take six. Meanwhile the dealer may have made arrangements with his bank to help finance him over a certain active period. He may have rightly counted on delivering this particular truck in three weeks from the date the body order was placed.

Let us say that the price of the truck complete with body is \$5000, and that there is a note due at the bank about the time the body was to be finished. Assume that the dealer needs a large part of price of the truck in order to meet the note. Delay in delivery, therefore, means that the dealer cannot meet the note on time, which situation is likely to cause the dealer more or less difficulty at the bank.

This situation will be largely wiped out by the general use of standardized bodies which will naturally be ready for immediate delivery. It should not take more than an hour to mount a body on a truck, although now it often does. Consequently, there is no reason why the customer cannot take delivery the same day that he decides to make the purchase, unless the body is to be painted.

It is safe to say that if nine of ten trucks could be delivered as soon as sold that the investment by the dealer could be cut in half in most cases where the dealer handles the body transaction.

Purchasers will be better pleased with their bodies when standardization is as well worked out as it should be and will be.

Obviously, they will like the immediate delivery feature that now only applies to a minor percentage of the sales. They will like the reduced prices which will obtain mainly among the larger sized bodies, since many of the types for small trucks are now reasonably low priced.

But most of all they will appreciate the change because production bodies must eventually be better designed and better built and of more uniform quality, improvements that must result from the general use of engineering brains which will be employed by the quantity builders, taking the responsibility of design out of the hands of the local builders. This applies, of course, largely to bodies outside of the delivery class. Big body production to-day is mainly confined to chassis of one ton or less.

The general use of standardized bodies will eliminate to a great extent mistakes that now creep in where the man buying the truck has the say regarding how his body is to be built although he may be guided, and often is, by the advice of the dealer. For example, several bodies were recently built for a certain large concern. They were sure of the dimensions they wanted and the bodies were built accordingly. After they were finished it was found that the tops were too low, the result being that every one of them had to be raised six inches. To do this the uprights had to be pieced out. The finished job, therefore, was not as strong or as neat as it was originally and of course the expense of the change was considerable. Instances of this sort could be multiplied indefinitely.

In most cases there is about as much reason for permitting the owner to specify the design of the truck he is to buy as there is for the body he purchases. The truck is sold to him complete, and he can take it or leave it. The same should apply to the body—in the majority of cases. By careful study of the subject by truck manufacturers, dealers and body manufacturers, the details of the types and dimensions of the bodies most suitable for 90 per cent of the truck business should be determined by conference and these designs should be pushed to the exclusion of all others, except in certain recognized cases where specially built bodies of different style or dimensions are really necessary.

Judging from the types of bodies that are in use in some parts of the country it is plain that the customer often does not know what is best for his needs.

He buys the bodies he does largely because they are the types in use around him. In the end, such men would be grateful if more suitable types were forced upon them by concerted action of the truck industry.

Broadly speaking, the most popular types in New York, Boston and Philadelphia, for example, have much in common in principle although they differ in name and in appearance. But, if this is so, it must be that one of these possesses certain superior qualities that the other two have not, or perhaps a combination type can be evolved that would incorporate the advantages of all three. We are talking now only of the most popular type. It must be self evident that the needs of these three cities are about the same, and that except for local fashion, and its prejudice, the most popular type used in any one of these cities would be found equally satisfactory in either of the other cities. It is difficult to come to any other conclusion.

If this body, with the best features of all three, can be the best seller throughout the Eastern territory it is logical to feel that this type should eventually become the best seller throughout the country.

Following out this line of reasoning, the conclusion must be reached that the majority of truck users would be better satisfied by a few well-developed types instead of by the infinite variety now obtaining. By careful analysis of the many types of bodies now in use, varying in trifling detail, the conclusion that a few types can satisfactorily replace those now in vogue is irrefutable. Concentration on the perfection of a few styles must result in the development of standardized bodies which will be more satisfactory to the customer than any now in use, superior in design, material, workmanship and utility.

Body standardization cannot be satisfactorily realized until truck chassis have been standardized. The truck is the foundation of the problem. Body standardization cannot proceed until the principal chassis dimensions are uniform.

It is desirable to stop and define a few truck body terms since there is considerable variation in their meaning in different parts of the country. The platform of the body rests on several cross-bars mounted on two long stringers which rest on the chassis frame members.

When a truck body platform is mounted on a chassis it is plain that it must fit in several respects. The stringers must be the same distance apart as the longitudinal truck frame members. Also the width of the stringers should be the same as the width of the frame flange. The clearance between the top of the rear wheels and the underside of the body with the truck unloaded should be about 6 in. Therefore if the frame is low and the wheel high, the necessary clearance must be ob-

tained by having sufficient height in stringers, and cross-bars. On the other hand if the frame is high, and the wheels low, even minimum height in stringers and cross-bars may make the clearance between body and wheels more than 6 in. Greater clearance is undesirable because it usually makes loading and unloading that much harder work and it raises the center of gravity of the load, making sideways and possibility of capsizing that much greater.

With these chassis variations in mind it is plain that the path of the stock body maker who builds a platform that is adjustable to any truck is not an easy one. Where the body hangs low over the wheels it is necessary in some cases to increase the clearance by adding two long strips, one under each stringer. This makes a patchy job, takes time and is certainly not good engineering although it is excusable from a standpoint of expediency. It is usually necessary to arrange the cross-bars so that one will not come directly over the wheels, for in most cases this would reduce the clearance too much. This means that the cross-bars must be shipped unattached OR some compromise method must be used which will eliminate the necessity of long cross-bars at about the points where the wheels may come. One stock body company has solved this problem very nicely by cutting two of the cross-bars off short and reinforcing the platform at these two points by two small angle irons which run the full width of the body. And there are other modifications of this idea. However, the important point to be driven home here is that such expedients and makeshifts would not be necessary if the distance from rear of driver's seat to rear wheels was standardized, a single dimension being selected for each truck capacity. Naturally extra expense and trouble must be involved in building a platform to meet this condition. Construction might be simplified and the cost of manufacture reduced if truck makers would get together on this point.

The fact that frames vary considerably as to width means that the stringers must be adjustable as to width.

In most cases this situation is met by leaving the stringers unattached to the platform. That is, instead of building the platform complete, the platform is assembled minus the stringers and these are only applied when the frame width is known. Attaching the stringers to the platform means that two long bolts running from the top surface of the platform to the bottom of the stringer must be put in place for each cross-bar. If there are seven cross-bars that means fourteen bolts, and fourteen bolt holes $\frac{3}{8}$ to $\frac{1}{2}$ in. in diameter and perhaps 12 in. long, each hole being countersunk in the stringer. All that extra work is required simply because frames are not standardized as to width. Naturally, the customer pays for this extra effort; an effort that is considerable when it must be accomplished by hand or with an electric drill, yet an effort that would be very slight if this work could be done in the factory, the place where it should be done.

Sometimes in order to reduce the height of the platform it is necessary to "let in" or notch the cross-bars or stringers, or both. This is extra labor and could be avoided if frame height and wheel diameter were standardized.

Most people consider a platform construction in which cross-pieces and stringers are "let in" stronger than where letting in is not employed. But with the usual stock body platform whether this can be done or not depends more or less on the clearance that must be obtained between the rear wheels and the under side of the

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Sweden as a Present and Prospective Market

The use of automotive vehicles, as well as the local idea of the kind of vehicle desired, is based chiefly upon the unsatisfactory condition of the roads. American cars lead there but Germany was an important competitor for this trade before the war. Improvement of roads on way.

A REPORT on automobile conditions in Sweden has recently been made by the French Chamber of Commerce there. In this it is pointed out that Sweden is a land of magnificent distances. The cities are far apart, especially in the northern section. It is a land of large, intensively exploited forests, of mines and iron works in remote places; the northern provinces, which are inaccessible by railway, offer a more fertile field for the sale of automobiles from year to year. In the southern districts, which are of more Continental appearance, and densely populated, automobiles are used in large numbers.

The Swedish road system comprises roads of an aggregate length of 40,000 miles. Country roads are narrow; during the winter period snow and mud make them anything but high-class automobile roads, and even in summer they are far from being in good condition. This is due in part to the scarcity of road paving material, and partly to the method used in building roads. Some blame, however, rests on the property owners, who are obligated to keep the roads in repair in proportion to the sizes of their premises. The roads are often crooked, because the ground is rough and not suitable for the construction of driveways, and wind in every manner around lakes and hills.

The numerous turns in the Swedish roads make an automobile tour in that country very fascinating, but they also make it impossible to achieve high rates of speed in automobile travel.

At the present time there are in use in Sweden approximately 70,000 motor cars. The predominant type is an open car of 15-20 hp. with four-cylinder motor. The demand is for durable types of car, and the chassis must neither be too wide nor too low. The spring suspension must be especially good; however, the majority of foreign cars are bought in the standard forms. The Swedes value particularly cars with elegant body work, and for this reason luxurious types of vehicles find the greatest market in that country.

The home industry is chiefly represented by Scania-Vabis, whose large works are located in Sodertalje, and which manufactures chiefly motor trucks, but also some passenger cars.

The following figures relate to the importation of automobiles in 1913, the last normal year before the war. The nominal value of a crown is 27 cents:

United States.....	285 cars, valued at	1,094,723 crowns
Germany	256 cars, valued at	1,254,732 crowns
England	76 cars, valued at	237,776 crowns
France	45 cars, valued at	258,077 crowns
Denmark	21 cars, valued at	880,960 crowns
Norway	7 cars, valued at	24,012 crowns
Italy	4 cars, valued at	25,287 crowns
Other countries.....	5 cars, valued at	15,085 crowns

Total2,990,620 crowns

The Swedish duty on imported automobiles, with or without bodies, is equal to 15 per cent of the gross value, not counting freight charges. The duties on parts varies according to the weight and the material used in construction. For parts of steel the duty is 0.05-0.50 crowns per kilogram.

The following table shows the import figures for the first 10 months of 1919, and for the sake of comparison the figures for the first 10 months of 1918 are also given:

	1918	1919
January	Cr. 21,573	20,652
February	49,139	167,257
March	31,341	83,066
April	192,365	444,317
May	73,714	408,122
June	38,482	749,099
July	44,764	1,636,795
August	22,509	2,567,591
September	35,810	3,082,099
October	14,967	4,008,313

The total imports for the first 10 months of 1919 thus amount to \$5,000,000, a very appreciable sum, which undoubtedly will come as a surprise to many manufacturers.

It is pointed out in the French Chamber of Commerce report that those cars which have been most successful in the winter contests of the Swedish Royal Automobile Club are in greatest demand.

American cars are in the lead, thanks to the efforts of Ford, and to the continued development of automobile design in the United States during the war. German cars are also very numerous, and previous to the war were very much favored. Fiat and Minerva occupy strong positions, which is to be ascribed to the energetic efforts of their representatives. French cars had a magnificent start, but in spite of the fact that they are known for their good quality and elegance, have lost much ground in late years.

In conclusion a few words are said regarding motor trucks, of which there are not a great many in use in Sweden. This is no doubt largely due to the condition of the roads as well as to the fact that these are too narrow to permit of one loaded truck passing another. For this reason the use of trucks is largely confined to the cities.

At the present time a movement is on foot to improve the road system in Sweden. The roads are to be widened and the bridges strengthened, and in spite of the slowness with which such a big undertaking can be carried through, it is to be hoped that these improvements will later serve to accelerate the introduction of motor cars.

As regards motor omnibuses, the conditions are about the same as above outlined. It is, however, noteworthy that the state railroads have inaugurated passenger transport on certain lines by means of omnibuses, and as the scope of this enterprise has constantly increased, considerable business may be expected from this source.

U. S. Army Training Courses for Automobile Mechanics

Several types of industrial training for automotive workers have been described recently in *AUTOMOTIVE INDUSTRIES*. Intensely practical work is being done along these lines by the U. S. Army. The following discussion of these army courses presents some excellent and interesting information.

By Harold F. Podhaski

THE two largest automotive technical schools in the world are located at Camp Hollabird, near Baltimore, Md., and at Camp Jesup, near Atlanta, Ga. Both are owned by the United States Government and operated under the direction of the War Department. The equipment at both these schools is worth many millions of dollars and the training is very thorough. The widespread interest of automotive manufacturers in the training of skilled workers makes interesting a description of the work done in one of these instruction camps.

The courses of instruction at both Camp Jesup and Camp Hollabird are virtually the same. There are twelve separate courses in the automotive field, the principal one being automobile mechanics. The others are ignition and carburetion, battery repair and rebuilding, chauffeur department, welding department, tire repair and rebuilding, blacksmithing and spring making, sheet metal and radiator work, woodworking and wheel building, painting, trimming and upholstery, warehousing and spare parts and automobile salvage.

Each of these courses is separate. Each man is thoroughly trained in the one course and no other, save those men taking automobile mechanics. This latter course includes training in several of the above subjects.

There is one instructor on the average for every six students. These instructors are civilians and recognized experts in their particular work.

The students at the training school are enlisted men of the army, most of whom are country lads who enlisted for no other purpose than to obtain this instruction. They may enlist for one or three years according to their status. Upon completion of their training course they are given a certificate or diploma of graduation, providing they are entitled to it; and the instructors and officials at the school feel that no man is entitled to this diploma unless he is really capable of filling a technical position in the automotive field upon his return to civil life.

When a man enlists in the army for one of these courses he is first examined by what is known as a classification board. His past experiences and his present desires are carefully considered by this board, which then decides what course he shall take.

Supposing an enlisted man is taking the automobile mechanical course, this course of training would be as follows:

He is first given what might be termed a sort of preliminary course before he is sent into production work at the shops.

Engine training is the first subject covered, several weeks being devoted to this preliminary work.

Tools, their use and abuse, care, arrangement, etc., and nomenclature of engine parts comprise the first subjects studied. Then follows the theory and operation of the four stroke cycle engine, the standard clearance of pistons, piston rings, piston pins, timing gears. Next are studied the use of precision instruments, including valve timing and setting, and then study of camshafts. Valve grinding is the next subject and then follow complete reviews of all the above work until the student is thoroughly familiar with the subjects he has learned—that is, as familiar as he possibly could be in the length of time devoted to these studies.

The next subjects taken up include the crankshaft, connecting rods, ball bearings, plain bearings, lubrication and the use of bearing scraper. The students do considerable work practicing scraping on salvaged bearings. Then follows bearing fitting and the use of shims, with next a complete review of this work.

Students are always assigned to these classes in groups not to exceed twelve so that the work under the various instructors in the preliminary training is almost individual. One-half of the preliminary work is devoted entirely to engine training and the other half to chassis training.

The men enter into actual production work as soon as they finish the preliminary training. The instructors work with the aid of charts and blackboards, and about \$150,000 worth of machinery and other equipment is installed for this preliminary work alone. There are, for example, ten salvaged motor blocks which the students tear down and rebuild during their first training for practice; there are dozens of rebuilt chassis frames used in the same way, and hundreds of parts of every kind found in an automobile or motor truck. There are also a dozen complete engines from standard passenger cars and motor trucks with steering attachment, and the students work on these, tearing them down and rebuilding them as they learn. The instructors purposely cause engine trouble which the students are expected to remedy. Until a man is able to "shoot trouble" with some degree of success he is not entitled to leave the preliminary course for actual production work in the shops.

The most important part of the training course is taken up when the men enter the main shops for production work.

Every passenger car or motor truck brought into these shops is entirely rebuilt. This plant is not a service station in any sense but a complete manufacturing plant. A motor truck may be brought into the shop a dilapidated, demoralized wreck seemingly beyond redemption—most of them are like this, for they went through the

war—but when that truck leaves the plant it is virtually a new machine.

Men completing their preliminary course in engine training in the automobile mechanics course, are then placed on engine production work in the main shops. Here they remain for several weeks and are given every available opportunity to work on as many different standard makes of engines as possible. Upon completion of this period they are again returned to preliminary chassis training, and completing this are returned to the shops where they are placed on chassis production.

The Government recognizes as standard the G. M. C. light delivery truck and ambulance, the one and one-half ton Garford, Packard and White, the three to five-ton Riker and Liberty, the latter designed for Government use during the war; and also recognizes as standard the Mack, F. W. D., Dodge, Cadillac and Ford. Students, therefore, taking this course of training, are thoroughly familiar with these standards in whatever department of the work they may be engaged.

When a truck or a passenger car is brought into the shops for rebuilding it is first taken to the assembly department. Men taking the automobile mechanics course receive instruction in this department also, and in chassis production and machine work, especially on engines. But those taking other courses specialize in that one department alone. There are men in the assembly department whose entire course includes assembly work. They tear down the cars or trucks as they come into the shops and rebuild them again when the various parts have come back from the other departments. When they leave this department—that is, after graduation and receipt of their diplomas—they are capable of holding positions in almost any assembly department of an automobile or motor truck plant, and especially those plants manufacturing the cars or trucks recognized as standard by the Government.

The instructors carefully study the students and their qualifications. Their ultimate receipt of a diploma of graduation depends upon the grades given them by their instructors during this period and through written examinations which are held at frequent intervals.

The instructors are very careful to select their men for training in that special work for which they seem best adapted. One man will generally show up better at one certain task than at some other and he is natu-

rally selected, then, for training in that particular work. When the men first enter this machine department they work on a sort of experimental lathe. This is known as the Liberty lathe and there are twenty-eight of them at Camp Jesup.

When the men become proficient on these machines they are transferred to real production work and given that work the instructor feels they are best adapted for.

If a man is particularly ambitious and has done well in his course, he is allowed to take a post-graduate course if he so desires. Most of these chaps, as previously stated, are country boys, and they enlisted for no other purpose than to qualify themselves for their life's work. Therefore, quite a few of them take this post-graduate course and this makes them exceptional men in their particular line.

Following this post-graduate course the enlisted man is permitted to go still further if he desires, taking even a more advanced course, and some of the students take advantage of this as well. This includes a course at the Georgia School of Technology, which will turn a man out as a finished artisan, not necessarily equipped with the higher mathematics, but capable of working in association with engineers of the first class in his future career. In fact this final course offers the man every opportunity to make good on a big scale if he has the right sort of "stuff" in him.

At present there are 600 students taking the various courses at Camp Jesup, and they are completely rebuilding on an average of 100 cars and trucks every month. There are ample facilities for taking care of 1200 students, and capacity at the plant for completely rebuilding from 250 to 300 cars per month.

Because these men are being trained primarily for ultimate work in civil life, officials in charge of the army educational work have promised to inject into the courses more instruction from the commercial angle. That is, more attention will be paid to the costs of performing the various operations and the men will be taught to look at their work from this point of view, which will be essential later on when they go to work in civilian jobs.

Major Robert C. Eddy, Commanding Officer at Camp Jesup, Atlanta, Ga., will furnish any further information concerning graduates available for industrial positions, and will be glad to discuss in detail the special qualifications of any man upon request.

French-German Automobile Trade

TO judge by official reports of French imports and exports, the low value of the mark is helping the Germans in building up their foreign automobile trade. During the first four months of the current year the German automobile, motorcycle and bicycle exports to France amounted to 2,765,000 francs, but during the following four months the figure had grown to 8,438,000 francs. The imports of German passenger cars increased particularly rapidly, from 360,000 francs during the first four months, to 3,285,000 during the second four months.

As it says in Goethe's "Faust," a real German never likes a Frenchman, but good French wine he drinks and prizes high, so there can be no doubt of the Frenchman's dislike for the German, but at the same time he does not seem to disdain riding around in a Benz or Mercedes if the rate of exchange enables him to get one of these cars at a bargain figure.

However, the excess of automobile imports from Germany is probably one phase of the war indemnity pay-

ment. To be able to pay the indemnity, Germany has to sell her products abroad, and she would naturally look first to her chief creditors for a market.

The French exports of automobiles, motor trucks, motorcycles and bicycles to Germany during the first four months' period of 1920 were valued at 1,093,000 francs, and during the second four months' period at 2,800,000 francs.

TESTS made with different white metal bearing alloys by the Bureau of Standards showed that the tin base alloys maintain their properties better at elevated temperatures than those containing lead. Results of tests are given which indicate that up to 3 per cent the lead in a high grade babbitt does not affect the yield point or ultimate strength at 25 deg. or 75 deg. C. The yield point of tin base alloy is not affected by heating for six weeks at about 100 deg. C., but is lowered in the lead base alloy by heating for only two weeks at this temperature.

Teachers Interested in Motor Transport Education Plan

Joint Conference at Pittsburgh develops many points of mutual interest and profit. Improvement of rural school system closely linked with the development of highways and highway transport. Committee definitely provides for mechanical and highway engineering courses.

REPRESENTATIVES of the automotive industry, national and state highway departments and the foremost educators of the country concur in the opinion that the outstanding and immediate effect of the first joint conference of the Permanent Highway and Highway Transport Education Committee with a group of school teachers will be the recognition of the interdependence existing between the development of rural life and good highways.

The ultimate effect of this initial meeting will be the employment of the talents and interest of school teachers and pupils in promoting the public interest which is essential for the support of the development of highway transport and engineering.

The meeting, held at the University of Pittsburgh Nov. 26, marked the inauguration of a nation-wide movement having as a prime purpose the stimulation of interest in the great problems affecting extension and improvement of highways and highways transport. There is a unanimity of opinion on the part of all interested in this work, which is admittedly in a pioneer stage, that nothing would render the program more insecure than neglect of the citizens of to-morrow.

The conference went on record as being in favor of adapting school studies to conform with the new subject in order to inculcate in the minds of the growing generation the essentiality of highway transport to the advancement of civilization.

This position is easily tenable, for it is an established fact that the impressions in youth invariably influence reflections of mature citizens. It is assumed that whatever prejudices are imprinted on the adolescent mind, such as a misunderstanding, either unconsciously or wilfully, of influences of highways on local affairs could seldom, if ever, be eradicated. Because education inevitably tends to alter judgment and manners, the leaders in this movement believe that the best results will be obtained by placing all available and authentic information regarding the problem at the disposal of school teachers generally.

The conferees realized that their efforts would fall short of the goal unless a uniform method of teaching could be devised. Failure to obtain uniformity in teaching the fundamentals of this new and vital phase of education would obviously involve undue and hazardous complications. The entire system would naturally be menaced through a multitude of conflicting ideas. With this thought in mind, the representatives of the National Automobile Chamber of Commerce, United States Bureau of Education, Bureau of Public Roads, farm organizations and other co-operating agencies made their plans. They made clear the fact that there is no greater need for the success of the endeavor than that of providing a working knowledge of the problem to the school teachers.

The Pittsburgh conference, therefore, served its purpose admirably. It established a contact between the promoters of the plan and 1500 instructors in Pennsylvania schools, whose assistance must be enlisted to put over the new subject, which is regarded indispensable to progress. In the strictest sense, the Pittsburgh meeting was not local or confined to the State; it is confidently expected that its influences will spread to other States, for the meeting was called primarily to initiate the actual movement under conditions which would inspire other States to take up the work along the same progressive lines. The enthusiasm which accompanied the presentation of this new subject to a large and representative group of educators augured well for the extension of the campaign.

Experience has made known the opposition of many farmers to expenditures for good roads. Automobile manufacturers and dealers know full well that sales are few and difficult where roads are inadequate for motor traffic. Just how the automotive industry and the farmer may be mutually helpful was brought out by various speakers at the Pittsburgh meeting.

As Commissioner Claxton of the Bureau of Education and chairman of the Permanent Committee on Highways and Highway Transport Education, aptly declared, "There is a need for economic adjustment between this means of transportation and that of railways and waterways. You must have a high degree of general education before this thing can come."

Roy D. Chapin, president, Hudson Motor Car Co., and a member of the Permanent Committee, told of the importance of highways in city planning. He was of the opinion that highway transport would influence city extension designs and outlays more than any other single item. Reference was made to the condition existing in Detroit, where the broad streets do not measure up to the increasing volume of motor traffic.

Chapin impressed his hearers with the necessity of city planners including a study of highway transport and related problems before committing themselves to any plan.

Advocates of good roads and greater sales of motor vehicles, which are incident to this development, have found it no mean task to arouse the interest of the farmer in the movement for better highways. Educators and spokesmen for the automotive trade agree that the campaign for consolidation of rural schools and development of community center and church attendance offers a way out. The farmer almost invariably opposes propositions which may mean heavier taxes. The small district school is no longer regarded as practical because its educational facilities are necessarily restricted. The consolidated rural schools, with more teachers and greater opportunities for education through use of more and better equipment, are recommended by educators. But, the consolidated

school is manifestly interwoven with the extension of highway transport and highways. These schools, which would abolish the isolated district school, require the use of vehicles in order that the pupils could reach the schools in time. The motor bus has proved effective and inexpensive. At present there are 280,000 rural school houses in the country. The program of consolidation calls for a reduction of this total to 70,000. Educators supporting the consolidated movement maintain that farmers must support the good roads movement, as well as the combined school house plan. Thus, the advocates of economy through fewer schools, must necessarily lend their assistance to the highway program.

The connection between these two schemes was illustrated by Superintendent of Schools Armstrong of Venango County, Pa., in the statement that the road program and rural school program are identical. He believes, and he said that he voiced the sentiment of other educators, that poor roads delay consolidation of schools. If first-class highways are built immediately, it will ultimately reduce the cost of school building. Good roads and the consequent benefits accruing from increased use of motor vehicles would eliminate expenses of secondary buildings. It is this economy feature of the situation that is expected to exercise its greatest influence on the farmer. As expressed by Armstrong: "Pennsylvania is behind the program which is for making better schools through better roads."

How broadening and effective is the influence of good roads and better methods of highway transportation was emphasized by Chancellor McCormack of the University of Pittsburgh, who told the conferees that development of this form of transportation removed the country from the dominion of labor organizations and other groups which interfered with the arteries of commerce to gain their selfish ends.

Thomas H. MacDonald, chief of the Bureau of Public Roads, pointed out that the highway engineers were doing their best to build roads better than the public in general thinks is required. The engineer looks forward to the increase in motor vehicle traffic and makes his plans accordingly.

The phase relating to safety methods, as explained by Miss Harriet Beard of the Detroit Board of Education, impressed the instructors with the necessity of presenting these subjects to their charges. Commissioner Claxton stirred them to a realization of their duty to spread the gospel of progress through support of the highway educational movement.

The meeting, in many ways, brought out the important part teachers must play in extension of highway education.

Mr. Chapin cited the importance of the automobiles and highways to problems of the day. His quotation from a statement by Herbert Hoover that fully 50 per cent of farm products fail to reach markets because of the lack of transportation facilities, was widely mentioned in conferences of educators, particularly groups from the rural districts.

Recommendations of three major committees expressed the views of the conferees on the best methods for furthering the movement. The Vocational Committee discussed the training of foremen, road supervisors and other officials connected with construction and maintenance of highways. They considered the question of training for chauffeurs, auto mechanics with special relation to the efficient operation of machines on the highway. The conference accepted their suggestions that a sum of money should be set aside for the preparation of an actual course of instruction which should be compiled by competent educators working in close co-operation with recognized experts in the occupations for which the training is to be

provided. It was urged that automobile factories, garages and other places where the men interested in these matters are employed, should arrange for part time and evening classes to meet the needs of workers.

The Highway Transport Committee's report, which was accepted by the conference, recommended that universities and colleges offer a required three-hour course of one year in highway transport and highway engineering as a part of their civil engineering courses and that not more than ten universities, located in different geographical sections of the country, should offer short period advanced courses covering various phases of highway transport and highway engineering.

The message of joint committee will be carried to the school children through revisions in textbooks. School officials throughout the country will be requested to revise textbooks on economics and civics particularly with a view of including chapters on highway transport.

Perhaps the most effective means of placing this matter before school authorities is provided for in the recommendation to the United States Bureau of Education that booklets explaining the advantages of this field should be published and distributed. With this co-operation practically assured by Government officials, stimulated interest should result.

State departments of education will be asked to form courses under the subject of safety first rules and to especially require a more strict enforcement than at present. The Legislatures in States where there are no laws requiring safety first course, will be petitioned to pass such measures.

Because of the prosecution of automobile owners in certain cities without regard to pedestrian offenses it is significant to note that the conference earnestly recommended the enactment of such legislation as will permit the regulation of pedestrian traffic by vesting a degree of responsibility of conduct in the pedestrian. It was also urged that municipalities be empowered to adopt ordinances requiring pedestrians to use designated crossings exclusively.

The next meeting of the Permanent Committee is scheduled for February. An invitation of the University of Michigan was tentatively accepted.

Accurate Measurement of Interior Diameter of Ring Gages

A METHOD for measuring the inside diameter of plain ring gages has been developed by the Bureau of Standards during the past month. The method is a very simple one and employs two steel balls the sum of whose diameters is slightly larger than the nominal inside diameter of the ring to be measured. The ring is laid on a surface plate and the larger ball placed in the ring, the smaller one then rests against the inside of the ring and on the larger ball. The difference in vertical position between the upper surfaces of the two balls is determined by means of a micrometer attachment. This dimension is easily converted into the vertical distance between the centers of the two balls. The value thus obtained forms one side of a right-angle triangle whose hypotenuse is the line joining the centers of the two balls and whose base it is desired to determine. Knowing the vertical side and the hypotenuse, it is possible to calculate the length of the base, which added to the radii of the two balls gives the inside diameter of the ring. The method permits an accurate determination of the contact pressure and can be and has already been used on extremely small holes. A greater accuracy can be obtained by this method than by any other used up to this time.

Pulitzer Trophy Air Race Supplies Engineering Data

Five smaller powered machines, which closely contested with the Verville Packard racer, are the subject of much interest on part of engine and plane designers. Performance of American entrants makes it apparent that this country maintains its leadership in aircraft development.

By W. D. Richardson

FROM a spectacular viewpoint, the achievement of the Verville Packard in breaking the world's airplane record for speed over a closed racing circuit was the outstanding feature of the Pulitzer Trophy Race held under the auspices of the Aero Club of America at Mitchel Field, Long Island, on Thanksgiving Day.

Piloted by Capt. C. C. Mosley of the Army Air Service, this winged monster, equipped with its enormous 600 horsepower Packard motor, negotiated the 132-mile course in 44:29:57, eight miles an hour faster than the world's speed record hung up by Sadi Lecointe, the Frenchman, in his Nieuport Special during the Gordon Bennett aviation races held in France last September.

Less sensational but of equal, if not even greater, importance to aviation progress were several other features:

Foremost of all, the demonstration of aviation's safety and certainty. Out of thirty-five machines that passed the first pylon all but eleven completed the three laps of the triangular course—Mitchel Field to Luffberry Field, near Wantagh, to Henry J. Damm Field, at Babylon, and return. It was a remarkable performance, one that should inspire confidence, indicating that airplane manufacturers have succeeded in designing and building motors that are reasonably reliable and dependable even under the stress and strain of race conditions.

Second was the unmistakable demonstration of public interest in aviation. Thirty thousand persons, estimated, made the journey to the army aviation center to witness the race, two special trains coming from New York.

Third, the proof that America, instead of lagging behind the other governments of the world in aviation, as is popularly believed, is really ahead of them in the way of successful designs. Seven distinct and comparatively new types of American machines were represented in the race and in practically every case the machines not only lived up to estimated performance but actually exceeded the marks made by them in previous trials.

Fourth, the race itself undoubtedly produced some performance and engineering data that will be useful in future design and construction.

It was a foregone conclusion that unless the same difficulty that caused its ignominious failure in the Gordon Bennett races, i.e., lack of sufficient radiation resulting in an over-heating of its motor, presented itself, the Verville Packard would outstrip the field. With its 600 hp. motor, it was far more powerful than anything entered in the race. Furthermore, it was essentially a racing design while its competitors were all machines designed and built for service. Its only competitors with even the slightest chance of winning were the Thomas Morse with a 300 hp. Wright (Hispano) motor, the Loening Special monoplane with a 300 hp. Wright (Hispano) motor, and the Curtiss-

Kirkham triplanes with their 400 hp. Kirkham motors.

Other American machines entered were the Vought V. E. 7 with the 180 hp. Wright (Hispano) motor, the Ordnance Engineering Company's Orenco with the 300 hp. Wright (Hispano) motor, and the De Haviland with the Liberty 400 hp. motor.

Foreign representatives were the British S. E. 5 with the 180 hp. Wright (Hispano) motor, and the Sopwith Dolphin with the 300 hp. Wright (Hispano) motor, the Italian Ansaldo S. V. A. with the 200 hp. SPA motor, and the French Morane Saulnier with the Le Rhone 110 hp. motor. A German Fokker with a 300 hp. Packard motor was entered but came to grief en route and could not be made ready in time to enter.

Outside of the performance of the Verville Packard, which was expected, the performance of five machines—the Thomas Morse, the Loening, the Vought, the Orenco and the Ansaldo S. V. A. furnished surprise and useful data.

Of these, from the standpoint of speed and consistency, the Thomas Morse proved its claim as being one of the fastest service machines in the world today. Not only fast but, more important than either, consistent and reliable. Here was a machine designed for 150 miles an hour, a mark which is bettered by 18½ miles an hour in the race. Two days later, in a speed trial over a measured course in order to beat the record of 192 miles an hour made by Capt. Bernard Romanet, the French pilot in a Spad, the Thomas Morse attained a speed of 171.25 miles an hour; whereas the Verville Packard bettered its average speed made on Thanksgiving Day by only eight miles an hour.

The Ansaldo S. V. A. was the only foreign representative to finish inside the first ten places and its performance in winning third place in a field of machines with double and treble its power speaks well for the efficiency of its design and motor. This machine—a stock machine which is now seeking a place in the commercial aviation world—completed the course in 51:57:62, less than seven and one-half minutes behind the Verville Packard and less than five minutes behind the Thomas Morse.

The Orenco, manufactured by the Ordnance Engineering Corporation and piloted by Capt. St. Clair Street, commander of the recent Alaskan expedition, finished in fourth place with an average speed of 151 miles per hour, furnishing another surprise.

Fifth place was won by a Vought V. E. 7 and, considering the fact that it was designed essentially as a primary training plane and that it was equipped with a Wright motor of only 180 hp., its performance in defeating the seventeen De Havilands is a considerable tribute to its designer. Its elapsed time was 55:39:19, or an average speed of 143.3 miles per hour.

The failure of either of the two Curtiss-Kirkham triplanes was a considerable disappointment to navy representatives. One of them, the same machine in which Roland Rohlfs set a world's altitude record and a world's climbing record and credited with a speed of 165 miles per hour, was confidently expected to outstrip the field with the possible exception of the Verville. It negotiated two laps in fast time and then developed motor trouble; while the second machine, after considerable difficulty in getting started, made a short flight and returned to the field.

The race marked the first public appearance in America of two new types—one represented by the Verville Packard and the other by the Loening Special, a monoplane with a wing-spread of only 29 feet. The latter was the only machine to present any strikingly new features—a wing with a negative dihedral angle, the first time that this innovation in construction had ever been flown. For two laps this little machine, with a 300 hp. Wright motor, sped around the course on even terms with the Thomas Morse but on the third lap, one mile from the finishing point, a water connection broke and Lieut. Bradley of the Navy, who was acting as pilot, was compelled to drop out of the race.

The value of racing has always been a mooted question. There is no gainsaying the fact, however, that in the automobile world, especially, a great many improvements have been the result of discoveries made during race contests. There are few who will deny that the scientific data obtained more than justifies the ends. So in aviation. Tremendous speed is not by any means the most important thing in aeronautical progress but it is of more significance than is apparent on the surface. In aviation, it is an established fact that increasing speed has been accompanied by increase in reliability and, after all is said, increased reliability is the one factor that is going to popularize commercial aviation. Speed in aviation means cutting down of air resistance, increasing the efficiency or lifting and propelling surfaces, increase in motor power, or advance in adaptation of the engine to the airplane—one or all. There is no question but what the aviation experts of the country, most of whom were present at the race, gained a great many new ideas and that these ideas will eventually be transmitted to the commercial aspects of aviation.

There is another important point in connection with the Thanksgiving Day races. This relates to public interest. More persons attended the meet than would have journeyed out to Long Island to see a great aerial liner embark on a non-stop, cargo and passenger carrying trip

to San Francisco. The love of the spectacular is far greater than the appreciation of something of more value commercially. The absence of accidents of any serious nature will be reassuring to the public at large, many of whom will regard the airplane in the light of a dangerous toy. The Thanksgiving Day race will do more to counteract the omnipresent fear of the air than any other similar event possibly could. The race represented an aggregate of twenty-four hours flying by several types of machines and motors over an average course without a single mishap. It brought aviation before the public eye and its effect will undoubtedly make itself felt in governmental recognition.

A technical question was raised by the comparative performances of the Verville Packard and the Thomas Morse. Here were two machines, one having double the motor power of the other, and yet in a 132-mile flight, the Thomas Morse's elapsed time was within two and one-half minutes of the Verville. It naturally raises the question: At what point does power as applied to the airplane, cease to aid in efficiency? We had motors of 300 hp. and less making a comparatively better showing than those of 400 and 600 hp. Of course, there is much that can be said in extenuation of the Packard 600; it was and is still an experimental motor. In France, the difficulties encountered by Major Schroeder lay in its inadequate system of radiation—the same difficulty that presented itself in connection with the development of the Curtiss Twelve, a modification of the Kirkham Twelve. In the Pulitzer trophy race, the same difficulty was encountered although in a lesser degree. However, instead of turning up 1900 r.p.m., as it is supposed to, the best that Capt. Mosley could get was 1700. As a result of the trouble encountered, the machine will be sent to McCook Field and tested with a low compression motor.

After all is said and done, however, it is generally admitted that the trend of motor development will not be along lines of increased power but along opposite lines. The Verville indicates clearly the difficulties encountered in adapting a design to a large motor. As a result, it is a rather ungainly-looking craft—huge and cumbersome. The demand for speed will be better met by smaller motors and more efficient design. The demands for commercial purposes by more economical motors, less temperamental motors.

Taken as a whole, the race gave an unmistakable impetus to aviation and has probably become a fixture in the world of aeronautics.

Summary of the Pulitzer Trophy Airplane Race

Place	Type	Motor	Pilot	Entered By	Elapsed Time	M.P.H.
1.	Verville Pack'd (Am.)	Packard 600 hp. (Am.)	Capt. C. C. Mosley	U.S.A.	44:29:57	178
2.	Thomas Morse (Am.)	Wright 300 hp. (Am.)	Capt. H. E. Hartney	U.S.A.	47:00:03	168.5
3.	Ansald S.V.A. (It.)	SPA 200 hp. (It.)	Albert Acosta	Aero Import Co.	51:57:62	154
4.	Orenco (Am.)	Wright 300 hp. (Am.)	Capt. St. Clair Street	U.S.A.	52:27:02	151
5.	Vought V.E. 7 (Am.)	Wright 180 hp. (Am.)	Lt. A. Laverents	U.S.N.	55:39:19	143.3
6.	De Havilland (Am.)	Liberty 400 hp. (Am.)	Lt. J. P. Roullot	U.S.A.	56:06:58	141.5
7.	De Havilland (Am.)	Liberty 400 hp. (Am.)	Lt. Carl Ellason	U.S.A.	56:09:39	141.4
8.	De Havilland (Am.)	Liberty 400 hp. (Am.)	Lt. J. B. Wright	U.S.A.	56:52:20	140.3
9.	De Havilland (Am.)	Liberty 400 hp. (Am.)	Lt. Charles Cummings	U.S.A.	57:08:12	140
10.	De Havilland (Am.)	Liberty 400 hp. (Am.)	Lt. D. L. Conly	U.S.N.	57:40:76	139.5
11.	De Havilland (Am.)	Liberty 400 hp. (Am.)	Capt. H. N. Heisen	U.S.A.	58:15:28	....
12.	De Havilland (Am.)	Liberty 400 hp. (Am.)	Lt. V. C. Finch	U.S.N.	58:32:04	....
13.	S.E. 5 (Br.)	Wright 180 hp. (Am.)	Capt. Maxwell Kirby	U.S.A.	59:42:67	....
14.	De Havilland (Am.)	Liberty 400 hp. (Am.)	Lt. Lawrence Claude	U.S.A.	59:56:53	....
15.	Vought V.E. 7 (Am.)	Wright 180 hp. (Am.)	Lt. W. B. Gwyn	U.S.N.	59:59:38	....
16.	Vought V.E. 7 (Am.)	Wright 180 hp. (Am.)	Lt. L. H. Sanderson	U.S.N.	60:09:38	....
17.	De Havilland (Am.)	Liberty 400 hp. (Am.)	Lt. W. R. Lawson	U.S.A.	60:48:46	....
18.	De Havilland (Am.)	Liberty 400 hp. (Am.)	Capt. H. B. Mims	U.S.N.	60:49:34	....
19.	De Havilland (Am.)	Liberty 400 hp. (Am.)	Lt. L. F. Bean	U.S.A.	61:01:62	....
20.	Vought V.E. 7 (Am.)	Wright 180 hp. (Am.)	Lt. R. W. Brown	U.S.A.	61:35:28	....
21.	De Havilland (Am.)	Liberty 400 hp. (Am.)	Lt. R. C. Moffat	U.S.A.	61:47:45	....
22.	Vought V.E. 7 (Am.)	Wright 180 hp. (Am.)	Sgt. J. H. Dunn	U.S.N.	61:50:38	....
23.	De Havilland (Am.)	Liberty 400 hp. (Am.)	Capt. Norbert Carolin	U.S.A.	62:40:22	....
24.	Morane Saulnier (Fr.)	Le Rhone 110 hp. (Fr.)	Charles Colt	Morane Saulnier Co.	63:16:33	....

Modern Industry Must Recognize Moral Obligations

The units of modern economic organization are interdependent. This interdependence arises through the ability to deal in futures; we could not go on were it not for the constant production for future use. The whole industrial structure rests upon the mutual honoring of contracts.

By Harry Tipper

A FRIEND of mine who is rather active in his work of labor organizations and who follows the trend of business considerations pretty thoroughly, started an argument with me the other day on the question of the union. He is thoroughly acquainted with the fact that I have no faith in the ability of the union and the manufacturer's group, as organized at present, to provide the basis of industrial peace. So he is not averse to drawing my attention to things which might be of advantage to the union side, or at any rate have no tendency to weaken their condition.

His argument started something like this: You have been rubbing it into me pretty hard about the inability of the labor leaders to secure the fulfillment of a contract made between the union and the manufacturers and you have considered this one of the great weaknesses of labor.

I have been obliged to admit that it was true to some extent, but I maintained that it was not true in a good many cases, and that the union lived up to its agreements at least as well as the manufacturer.

Now what's happening? Prices begin to slump and contracts are cancelled between manufacturers without any regard to the obligation of the contract. With all your knowledge of the union, it will be pretty hard for you to find evidence of as many broken contracts by the unions as you can find in the last four months between manufacturers, on the contracts they have made with each other.

It was a pretty hard statement to answer, because the cancellation of contracts in some lines of an industry in the last few months has become notorious and has involved all sections of that industry.

It was not much use in pointing out to my friend that this thing had not happened before between manufacturers. There was very little use in pointing out to him the necessity for contractual obligations in the running of modern industry.

The only ground upon which I could take any firm position, was the ground that the failure of another man to recognize his moral obligation, did not justify the failure of the labor leader or the worker in the same thing. An argument based upon that point carries comparatively little weight, however, with the practical man in modern industry, and I don't believe it made much of an impression upon the gentleman with whom I was speaking.

It is unfortunate that the exhibition of the disregard of the contract between manufacturers should have been sufficiently widespread at this time to justify in their

own minds, or, at least excuse to the labor leaders and the union officials, their own actions in the breaking of contracts when it was to their own advantage to do so. After all, however, the disturbance lies very much deeper and is likely to have a very much more important effect upon the future of American industry.

In these articles the complete interdependence of the modern economic organization has been stressed a good many times. The reason for its emphasis is the general lack of comprehension regarding this interdependence and what it means.

This interdependence has grown up through the ability to work in futures, and the modern organization would be impossible if it were not for the constant production of fabricated products intended for future use or consumption.

A very large part of the operations in modern industry concern themselves entirely with the production of material, equipment, machinery and so forth, which is needed in order to provide production for next year, the year following or twenty years from now.

The basis of this whole speculation upon the future and the stable foundation of its operation has been the contract which obligated one man to take from another a certain portion of the product he was making for a given length of time in the future, and under conditions of future manufacture, it would enable him to plan his work and continue with his organization. Anything which interferes with the stability of this future production slows down the whole machinery and tends to reduce its efficiency and the ease with which the investment may be made in its progress.

It takes away from between men the only obligation which permits of continuous operation of full power organization and investment put to the maximum capacity. The deterioration of it removes the only piece of service between men which can permit the development of organization to a reasonable point of efficient co-operation.

It is intimately concerned with the relations between employer and employee as there can be little development of co-operation between these unless the moral obligation of the contract is reasonably observed.

Convulsions in business are likely to be more severe and the changes more violent where the future cannot be depended upon through the regular instrument of its operation—the contract.

Some time ago in one of these articles it was pointed

out that the mutuality of the contract was its most important feature and that in the growth of modern industry this mutual obligation in respect of contract had been practically destroyed in the relation between employer and employee.

It is this general deterioration in the mutuality of obligation in contractual arrangements that has led to the renunciation of contracts by many manufacturers between each other, when there was no advantage to the individual concern in the observance thereof.

This condition is dangerous because the interdependence of modern industry is so complete and so delicate that anything which breeds suspicion reduces confidence and requires extraordinary measures of protection, disturbs that delicate balance and reduces the volume and efficiency of industry's operation.

The needs of a growing population do not grow less in actual fact, but their disposition to supply those needs varies in accordance with their confidence in the fairness characterizing those with whom they must deal, their confidence in the future stability of their own operations, and the future stability of the operations of other industrial departments.

It is not wise for me to steal from my partner or to put him in the hole for a fancied temporary protection when I depend upon him for a part of my life necessities and cannot escape that dependence. Every manufacturer, every worker, is dependent for his own well-being to such a large extent upon the well-being of the rest of the community that all matters which affect the confidence, the trust and the

stability of future operations should be considered with great care and not lightly disposed of.

The deep suspicion with which the worker regards the policies and actions of employers in a general way is due very largely to the gradual destruction of the mutuality of obligation between the two in their relations with one another.

The suspicion with which the public has regarded the recent price development and their determination to withhold buying, has been due, very largely, to the suspicion that they were not being fairly dealt with and that the mutuality of obligation was not being observed.

The cancellation of contracts which followed the slackening of buying has served only to increase this suspicion so that manufacturing establishments are no longer able to depend with confidence upon their future relations with their customers on the basis of the expressed obligation. This is not likely to decrease the unrest and it is detrimental to the efficiency and the volume of production not only for the time being, but for a good many years after the circumstances which brought it about.

It is easy to create suspicion; it is difficult indeed to remove it. The circumstances which create it may be temporary, but the suspicion itself is likely to last and to be removed with difficulty. Nothing is so important to the growth of modern industry and its peaceful progress as the clear understanding of the mutual responsibility and the careful consideration of the practical instrument of that responsibility upon which the future operations of industry largely depend.

Making the Punch Press Safe and Efficient

(Continued from page 1120)

ment enters in many ways other than the one of safety.

The safety man in beginning his work has several persons whose co-operation he must gain and to whom he must "sell" his idea. The management may look askance at his efforts because, as noted previously, punch press safety work has in the past usually meant reduced production. Results are a convincing argument in this case.

The foreman and the operator must be sold on the plan. The foreman will also be afraid of reduced production and consequent poor showing which his department might make.

The operator, while desiring safety, will not wish to have his earnings reduced. In this regard, the work can

best be accomplished by maintaining piece rates at their set level and allowing the operator to benefit along with the management by improvements made in the operation.

While the work done by Mr. Kaems has in practically every case resulted in a production increase, he does not believe the human element should be sacrificed to production.

"If production is more important than hands and fingers," Mr. Kaems says, "industry is on the wrong track. Piece rates on punch presses should be set so that a man is able to earn his fair wage without risking injury; that is, the press should be made as efficient as is consistent with safety, and piece rates should be set upon that basis."

Practical Benefits of Body Standardization

(Continued from page 1124)

platform. Instead, braces of one sort or another must be used and these are usually objected to on the grounds that this construction is not as strong.

To recapitulate: In order to make it possible to build truck bodies completely and have them fit all chassis it is necessary to standardize the following dimensions:

1. Distance from rear of driver's seat to rear wheel centers.
2. Width of chassis frame.
3. Width of chassis frame flanges.
4. Difference in height between top of frame and top of wheels; or better yet, standardization of wheel diameters, and frame height from the ground.

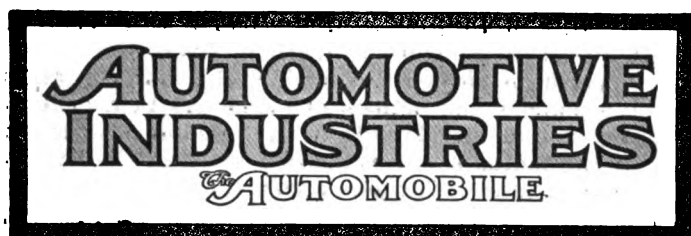
If it is not feasible to standardize the distance from rear of driver's seat to rear wheel centers by the use of a single dimension for each truck capacity, then three

or four dimensions should be so selected that the rear wheels would always come between two cross-pieces, and never over one of them. This assumes that cross-piece spacing would also be standardized, a thing that is both feasible and desirable.

Standardization of frame widths would make shifting of the stringers unnecessary.

Standardization of chassis frame flanges would permit a flush fit between the stringer sides and the frame. As it is now it is necessary to have stringers of several different widths to fit frames with different flanges.

Standardization of the clearance between wheel and platform would greatly simplify the fitting of the platform to the chassis. It would also make it quite feasible to build camelback (sloping) platforms on a production basis, a thing that is all but impossible now because of the varying truck dimensions.



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Publicity That Detracts

MOTION pictures are being utilized extensively by automotive manufacturers for publicity purposes. Sometimes pictures of the plant are featured, sometimes the product is shown in use, and sometimes particular achievements of the product form the basis of the pictures. In every case the captions play an important part.

Many of these captions exhibit the same glaring fault which renders ineffective so much publicity of other kinds. The name of the organization or product appears frequently and in large letters; exaggerated statements are made in its behalf and often good photography is entirely offset by absurd captions.

Whether exhibited by dealers or to dealers, this sort of thing is even less effective in motion pictures than elsewhere—if such a thing is possible. The public is accustomed to high grade motion pictures, with entertaining, if not always intelligent, captions. It will be interested in nothing less. The elimination of crude publicity statements from the captions of

such pictures will do much to increase both their popularity and effectiveness.

Forestalling Complaints by Intelligent Fuel Saving

MANY car manufacturers are aiming to decrease the fuel consumption of new models, but the average car already out continues to waste fuel unless its owner happens to be sufficiently interested in getting better fuel economy to insist upon having desirable adjustments or changes made. The service station, especially if its policy is directed by the car manufacturer, seldom suggests a change in equipment and too frequently is not particular about carburetor adjustment so long as the car performs reasonably well. It is a well-known fact among engineers that most engines pick up more quickly and handle a trifle more smoothly on an over-rich mixture. This is an easy adjustment to make and the one usually made. Yet many owners would gladly sacrifice a trifle in performances to secure lower fuel consumption if they understood the benefit to be derived. After all, the difference in performance as between the car with a slightly lean and an over-rich mixture is small, especially when manifold conditions are right, while the saving in fuel may amount to 20 per cent or more, and other advantages are gained.

Frequently, however, the manifold is too large or the heating of the charge inadequate, so that no really economical adjustment is possible. In such a case an up-to-date manifold of proper bore and with adequate heating might well be supplied by the car manufacturer at reasonable cost. This would go far toward keeping satisfied customers.

Poor carburetion and manifolding give rise to many difficulties which are both annoying and expensive for the user. These include rapid accumulation of carbon deposits with consequent tendency to knocking, poor lubrication due to dilution of crankcase lubricant by unburned fuel, and tendency to loading with consequent irregular running. Would it not pay to correct these difficulties at the source rather than allow them to be a constant cause of trouble? Fuel promises to become less and less volatile, and consequent service problems are more and more aggravating. Why not frankly recognize the fact that most cars a few years old can be greatly improved by rendering intelligent service, offer this service at moderate expense and thus solve or forestall many complaints?

The Moral Side of Contracts

WE invite a careful reading of the following statement by H. F. Barker, Chairman of the Committee of Credit Co-operation and Credit Methods of the National Association of Credit Men. This statement, evidently, was made public after much consideration on the part of Mr. Barker. It follows:

"A careful survey of the cancellation practice reveals a more serious situation than was at first

believed. The indefinite holding up of orders for later instructions has been a most potent factor in the slowing up of business. A surprising lack of moral fiber has been revealed.

"Proper value has not been placed on the purchase agreement. We have indulged in loose practices and nothing has given us a clearer insight into this unfortunate thing than the cancellations of recent months. When the market was in the sellers' hands questionable practices were frequently resorted to, which in effect are just as serious and deserving of condemnation as cancellations. Purchase agreements were often neglected when the commodities could be sold at higher prices. Not placing, therefore, the sole responsibility on the buyer, when conditions were reversed and the market came to his hands, yet there has resulted from the lack of good faith in the treatment of orders a damage to business which we have endeavored in a general way to estimate at \$250,000,000.

"It is but just to say that this is a spiritual problem, and the world in recent years has been dealing with spiritual things, but in a materialistic manner. We must inject more religion into business!"

"Religion, we take it, is a very broad word as used by Mr. Barker.

Tire Temperature and Pressure

A GREAT many varying claims have been made regarding the increase in tire temperature and the corresponding increase in pressure due to high road speeds or high atmospheric temperature. The question has become particularly pertinent in connection with giant pneumatic tires used on trucks. With these large tires, which are of relatively heavy section, it is planned to operate trucks at sustained high speeds over fair to medium roads. The life of a tire of course is very intimately associated with the temperature at which it runs, and practically all of the tire company laboratories at present are endeavoring to produce a tire that will generate the least amount of heat, and upon which heat will have the least effect.

All tires, when carrying a load, have local distortion at the point of road contact. The area of contact surface, in square inches, multiplied by the air pressure, balances the load, providing the tire offers no resistance to flexing. But this balance of forces is affected by the frictional resistance of the carcass to bending and tractive stresses. These factors vary in amount, depending on construction and design of the tire, and give rise to the generation of heat.

The Grant tire, by reason of the greater air pressure carried, and the greater tractive stresses it must withstand, requires a stronger carcass of larger cross-section, than is used in smaller tires. The resulting action between the greater number of cord layers and greater bulk of material necessary tends to generate heat more readily and retain it longer than the thinner carcass tire used in automobile service, particularly if the tires are used with low inflation pressure or with overloads at standard pressures.

With low inflation pressure, a tire is deformed until the greater supporting area at the road contact

times the lower pressure balances the load. This distortion causes excessive bending action and displacement of the tire carcass, and promotes rapid generation of heat. The same is true with overloads when applied to the tire at standard inflation pressure, since the tire is similarly distorted.

Excessive speed is a dangerous factor that must also be considered in the abnormal heating possible in tire service. Overloading and over-speeding, either singly or in combination, constitute an abuse and promote a more rapid failure of the tire. Hence it is important that in selecting pneumatic tires of proper capacity for truck use due consideration be given to both the inflation pressure and the speed, for both of these factors are as important as loading, in respect to their effect on tire life.

The relation of pressure increase to temperature increase is practically in accordance with Boyle's Law, as we may consider the volume a constant. That is, absolute pressure varies as absolute temperature.

As an example, assume that a tire with an initial pressure of 120 lb. at 70 deg. Fahr. attains a maximum temperature of 140 deg. The resultant or final pressure, according to this law, would be approximately 136 lb., or an increase of 16 lb. per sq. in. This increase of pressure certainly cannot be considered dangerous, as the construction of the tire provides a safety factor of three or four. Heating of tires is not, therefore, dangerous because of the rise in pressure resulting, but because it indicates frictional and abrasive action in flexing which result in rapid deterioration.

The Responsibility of Power

THE movement of industry is slowly but certainly in the direction of a more complete development of the individual. Many barriers in the form of monotony work, blind-alley occupations, etc., operate to hinder that movement, but the fundamental forces underlying our modern civilization carry it forward. Its first crude manifestations became evident when political autocracy was first threatened; its later voice is heard, speaking, it is true, in a confused tongue, in the current demands of labor for a larger share in the determination of industry's progress.

But under any circumstances, short of actual socialism, the modern business executive must hold a great potential power over the lives of the army of employees in his organization. To administer that power wisely, so that the development of his business will coincide with the development of the various individuals in the organization, to mold his business policies along the lines of sound human progress—this means personal benefit together with social service.

"What a wonderful opportunity an executive in a big business institution has to influence the lives of thousands of men and women!" says Thomas Dreier. "Few professional preachers have as great an opportunity. The great executive is more powerful than kings. From him goes forth an influence which manifests itself in thousands of homes. A business builder to-day must also be a man builder."

du Pont Elected G.M.C. President

Durant to Retain Place as Director

Inauguration of Conservative Policy Seen in Change—Present Operations at Minimum

NEW YORK, Dec. 1—Pierre S. du Pont was elected president of the General Motors Corp. at a special meeting of the board of directors yesterday afternoon. He takes the place of William C. Durant, who ceases for the present at least to be an active factor in the affairs of the great automotive combination, although he retains his place on the board of directors. Pierre du Pont continues in his former office as chairman of the board. No other changes were made in the organization.

Announcement of the momentous change in the affairs of General Motors, which probably presages a more conservative policy than has been pursued in the past, was contained in a brief statement which said:

"Pursuant to the determination of W. C. Durant to retire from the presidency of the General Motors Corp., at a meeting of the board of directors this afternoon his resignation was accepted and Pierre S. du Pont was elected as his successor.

"Mr. du Pont represents the large interest of E. I. du Pont de Nemours & Co. in the General Motors Corp.

"No changes in the offices' personnel or in the conduct of General Motors business is contemplated."

The only announcement from Durant's office was this laconic addition to the formal statement:

"In connection with Mr. Durant's retirement from the presidency of General Motors Corp. and his plans for the future, Mr. Durant says that he intends to take a well earned vacation and devote his time for the next few months to his personal affairs."

Durant Not at Meeting

Durant declined to add to this outline of his plans, stating that he was too busy to be seen. None of the directors were communicative when the meeting adjourned. They left the General Motors building immediately without stopping for a chat with the retiring president, who did not attend the meeting.

The session of the directors lasted about two hours. The only business transacted was the election of a new president and this was a mere formality. No action was taken on the question of

GENERAL MOTORS BOARD

NEW YORK, Dec. 1—Here are the directors of the General Motors Corp.: P. S. du Pont, chairman; G. F. Baker, Jr., H. H. Bassett, A. G. Bishop, Arthur Chamberlain, R. H. Collins, W. L. Day, H. F. du Pont, Irene du Pont, Lamot du Pont, W. C. Durant, J. A. Haskell, F. W. Hohensee, L. G. Kaufman, Sir Harry McGowan, R. S. McLaughlin, William McMaster, C. S. Mott, Seward Prosser, J. J. Raskob, A. P. Sloan, Jr., J. T. Smith, E. R. Stettinius, Edward Ver Linden, F. W. Warner, W. H. Woodin, C. M. Woolley, O. D. Young.

dividends and the time was taken up with reports of the heads of the various divisions on the general business outlook as it relates to the company.

No statement of plans for the future has been made by du Pont, who already is in charge of the corporation's affairs. Durant's personal effects were removed from the offices yesterday. It is expected the new president will devote most of his time to the direction of General Motors, although he will have the active assistance of other members of his family and of representatives of J. P. Morgan & Co.

These men have been prominent in General Motors ever since the Morgan interests bought into the company last June. It was mainly as the result of their suggestions that General Motors was among the first of the automobile companies to curtail operations last summer before the far-reaching effect of readjustment was foreseen except by those who had followed finances closely.

No Expansion for Present

It is considered unlikely that there will be any expansion of the company until industrial conditions are stabilized. General Motors is pursuing a most conservative policy at present and is producing only enough vehicles to meet immediate demands. Nearly all its plants are operating on a greatly reduced schedule and some of them are closed entirely. It is perhaps significant of the policy of the new controlling factors that the Sheridan Motor Car Co., which was to have produced two new passenger car models at Muncie failed to go into production after making public specifications of the cars and beginning an advertising campaign.

Announcement also was made at about the time the new interests came into the company that greater attention would be paid in future to the manufacture of

(Continued on page 1146)

Airplane Seizure Is Mystery Here

Identity of American Purchasers Undisclosed—Action of Allies Creates Surprise

NEW YORK, Nov. 30—There is much speculation in aviation circles in this city over the identity of the American purchasers of eleven Junker planes of a new type, seized at Hamburg by the Allied Air Control Commission while awaiting shipment to this country. The planes are built entirely of metal along new lines. It is understood that England, France and Italy will divide them. The sudden activity of the Allies in seizing these machines has occasioned some surprise for they made no attempt to stop earlier shipments of Junkers to the United States.

The seizure was made on the ground that the Germans have failed to comply with the aviation sections of the Treaty of Versailles. The treaty prohibited the building of aircraft in Germany for six months after it was signed. This period expired July 10, but the Allies assert the Teutons have not made good on the delivery of all their military aviation material. The Allies recently demanded the huge Zeppelins, Bodensee and Nordstern, on the same ground.

It is regarded as certain that none of the seized Junkers were ordered by any of the Government departments, for the army and navy air service are entirely familiar with the plans of other nations to use the United States as a catspaw in their aerial development and they are not likely to help build up the industry in Germany. It is thought possible, however, that a commercial air navigation company which proposes a line between San Francisco, Los Angeles and Phoenix, Ariz., may have been in the market for new type German planes.

Former Shipments Not Stopped

France and England were entirely familiar with the fact that new all-metal Junker planes were being built in Germany, but for some reason best known to themselves made no effort to prevent their shipment to this country when John Larsen appeared here with his widely-heralded machines. This invasion by Germany gave the aircraft industry in the United States a black eye from which it has not yet recovered, but it is not likely this caused any special grief in the Allied countries. They regard this country as the best field for the dumping of surplus army aircraft, and Germany also seeks the penetration of the United States in helping her gain the

(Continued on page 1144)

Domestic Markets Continue Dull

Sales in November Show Little Gain

General Depression Shown in Reports—Used Cars and Credits Drawback

NEW YORK, Nov. 30—This month comes to an end with dealers in practically all parts of the country looking forward to the approaching shows to terminate the sales slump which has been in progress throughout the fall. While in some centers the automobile business is reported almost at a standstill, in others November was at least as good or a better month than October, which showed some improvement over September.

Despite low crop prices business generally is better in the country than in city districts. In the Middle West, where the depression has been felt for months, the farmers are beginning to sell their wheat and agencies for transporting it are improving their facilities. This is releasing some money for purchase of cars and also is prompting some truck purchases—for the transportation work itself. In the Southeast there has been a slight pick-up in automotive business in spite of uncertainty as to future prices of the principal crops, notably cotton. In the Northwest there is little present business but considerable optimism in Minnesota and Wisconsin, but conditions in Montana and the Dakotas, as well as in Colorado, are discouraging, particularly to the country dealers.

In several sections some dealers have dropped out and their lines have been absorbed by former competitors. In the main, however, despite failures here and there of intensified sales campaigns, there has been some improvement in business as a result of more intelligent and aggressive selling effort.

Des Moines—The trade situation has shown no improvement in Des Moines and conditions at present are practically stagnant as to actual sales. The situation is best illustrated by this week's experience of one important distributor who attempted a high speed sales contest backed up by a fair amount of advertising, using twelve experienced salesmen for five and a half days. The results were one sale of a second-hand Ford and one new job for April 1 delivery. Another distributor put on an enclosed car show for a week without a sale. The situation in Iowa is possibly more acute than in some States by reason of the fact that the entire business is dependent almost directly upon the farmer and the present falling scale of farm produce prices has temporarily removed him from the purchasing field. Bankers and farm

organizations are holding conferences all over the State in an attempt to relieve the credit situation. Des Moines bankers say conditions will be better by Jan. 1, but automobile men can see no relief until some time later.

Philadelphia—Slow but gradual improvement in both sales and inquiries, is the way passenger car men characterize the trade situation in their line. Motor truck business remains slow and is not so good as a week or two ago. While passenger car dealers are looking to the automobile show, which will follow that in New York, to stimulate trade, the motor truck dealers will not decide until their meeting, Dec. 7, whether they will have a show this season. In the accessories line this month is reported to be the poorest in the entire year, sales generally having dropped off not only from last month but also from the corresponding month a year ago.

Atlanta—Interviews with several Atlanta dealers indicate that industry is getting back to business. The public is displaying more interest and sales are picking up gradually. No return to normal is expected for some time, but dealers are confident that after the holidays sales will experience still greater stimulus. Dealers selling cars on which prices were recently reduced state this has increased interest slightly though not to any large extent. If cotton climbs in price to any substantial degree, dealers believe normal condition of trade will result much sooner than otherwise. Similar conditions hold true throughout the Southeast, according to Atlanta distributors handling cars in surrounding States.

Denver—Some distributors say steady improvement in trade situation but others complain of a standstill, and some country dealers are reported ready to quit business until conditions are adjusted. Many are disappointed by the failure to profit, as they expected, from first payment, Nov. 15, on the sugar-beet crop, although others say it is too early to test results and predict sales the next two weeks to farmers. Some dealers are gloomy because the drop in grain prices is considered making conditions worse than for a long time. The handicap of freight car shortage is causing slow crop cashing. Some report lively gain in the number of prospects visiting passenger car salesrooms, but say there is more shopping than usual in proportion to sales made.

Cleveland—Retail trade, both passenger and commercial, is at a low ebb at the present. Price reductions that have been made in certain cars brought a slight stimulation of buying, but it is the consensus that they are merely regarded as a forerunner of other reductions and consequently it is thought consumers are

(Continued on page 1139)

King Claims Sold on 40 Per Cent Base

Creditors Fail to Agree on Asset Conservation Plan — May Continue Car

NEW YORK, Nov. 30—Merchandise creditors of the King Motor Car Co. who failed to agree to a plan outlined by S. S. Meyers, general counsel of the Motor and Accessory Manufacturers Association, for the conservation of its assets, now are accepting 40 cents on the dollar of their claims from C. A. Finnegan, head of the Susquehanna Holding Co. of Buffalo, who purchased the \$500,000 claim of Artemas Ward, Sr., for 33 1/3 per cent.

Finnegan proposes to purchase the assets of the company in the expectation of operating it as a going concern in the old plant of the Swedish Crucible Co. under the management of A. Weber, an officer of the Buffalo company. The elder Ward sold his claims against the company which he backed, only after it became evident the creditors could not agree quickly upon a plan of procedure.

The claims of other creditors now are being purchased by Finnegan for sums running up to 40 per cent of the amount due.

This was the return date on the petition for a receivership which was filed by attorneys for the Wards, father and son. Finnegan was in court to announce that he was the majority creditor and sought control of the company through the purchase of its assets.

Holds Majority of Claims

Finnegan had expected to purchase the assets at a private sale, but it was announced by H. L. Crusoe, agent for the Detroit Trust Co., which was appointed receiver, that the receiver's sale would be held within the next two weeks and that several others would bid on the property. Though Finnegan may have to bid against other prospective purchasers his position as holder of the majority of the claims will place him in a strong strategic position, and it is considered certain the company will be continued under his direction. The merchandise creditors now have no option but to take the best offers that they can get.

The affairs of the old E. R. Thomas company and the truck division of the Chicago Pneumatic Tool Co. were wound up by Finnegan. He also tried to get control of the Allen Motor Car Co. when it was thrown into receivership, but his proposal was not acceptable to the creditors and operations were continued under the receiver.

Standard Position Shown in Statement

**Annual Earning Capacity Under
Reorganization \$2,000,000—
Total Assets \$23,000,000**

CLEVELAND, Dec. 1—A plain statement has been made of the financial condition of the Standard Parts Co., which since early in September has been operated by receivers on the application of a stockholder. The statement was made by the reorganization committees of the \$20,000,000 parts corporation to fully inform stockholders, who are being asked to subscribe to \$3,000,000 of additional preferred stock as one of several means for providing additional capital.

The statement says that the company's plants are capable of producing \$40,000,000 of business a year and before the recent depression in business were actually shipping \$3,000,000 in finished products a month. Lack of working capital—not lack of business—was responsible for the company's present difficulties. The reorganization plan will provide the necessary working capital.

When the reorganization plan is put into effect the company will have the following types and classes of securities outstanding: \$4,000,000 loans with Cleveland banks at 6 per cent; \$3,000,000 prior lien 8 per cent preferred stock; \$4,050,000 Class A 8 per cent preferred stock; \$5,689,500 of old 7 per cent preferred stock; 115,619 shares of common stock, no par value, while the total interest requirements and dividends is \$1,502,265.

The committee says that on \$20,000,000 of annual business the company should earn \$2,000,000 or a net of \$497,735 after interest and preferred dividends or \$4.30 per share of common stock. On \$40,000,000 of annual business—the maximum—the committee says \$21.60 per share of common may be earned.

Inventory Totals \$6,159,818

Assets are listed as follows: Cash, \$181,027.75; U. S. Government securities, \$7,250.00; customers' notes and accounts receivable, \$3,400,851.83; less allowance for doubtful notes and accounts, discounts, \$516,500, making the net of customers' notes and accounts receivable, \$2,884,351.83; merchandise inventory, \$6,159,818.78; securities, employees notes and miscellaneous accounts, \$135,556.93; land, buildings, machinery and equipment with depreciation deducted, \$11,025,833.14; investment in controlled companies Bock Bearing Co., \$2,272,667.48 and Boston Service Station, \$94,654.02, and prepared expenses, \$191,205.32, or a total of \$22,952,365.25. No credit is taken for good will, patents, etc.

The liabilities are listed as follows: notes payable \$6,557,514.90; trade acceptances payable \$240,483.03; accounts payable \$2,665,305.50; accrued accounts \$156,889.57; reserved for unentered invoices, contingencies, etc., \$250,000, or a total current assets of \$9,870,194. Less

minimum proceeds to be realized from the sale of capital securities, within 30 days after date of subscription, \$3,300,000; three months after date of subscription, \$750,000; six months after date of subscription, \$750,000; nine months after date of subscription, \$750,000, or a total of \$5,550,000 to be deducted from the \$9,870,194 of current assets, leaving a balance of \$4,320,194.

Liability Reserve \$13,000,000

Deferred liability reserves, etc. Nominal: capital stock preferred; prior lien 8 per cent, \$3,000,000; Class A, 8 per cent, \$4,050,000; present preferred, 7 per cent, \$5,689,500, or a total of \$12,739,500 of this class plus \$375,637.50 of accrued dividends, or \$13,115,137.50.

Net tangible assets available for common stockholders, \$5,055,979.50; 115,619 shares of no par value common stock to be issued, \$18,171,116.73. Total liabilities \$22,952,365.25.

The various classes of stock to be issued and outstanding stock will be protected by net tangible assets as shown in the following percentages: Prior lien, 8 per cent preferred stock, 599 per cent; Class A, 8 per cent preferred stock, 370 per cent; 7 per cent old preferred stock, 192 per cent, and common stock, 115,619 shares, \$43.73 book value per share.

Franklin to Increase Capital \$1,500,000

SYRACUSE, N. Y., Nov. 27—H. H. Franklin Mfg. Co. will issue \$1,500,000 in 7 per cent cumulative preferred stock at par \$100. Following its custom the company will offer the stock direct to the public to permit of wide distribution. By following this policy in its former issue the company has 2155 stockholders representing every State in the Union and a number of foreign countries. Through it also the company has obtained a valuable degree of advertising. The company declares that at the completion of this financing each share of preferred stock will be protected by net assets equivalent to \$271.

FORD MAINTAINS SCHEDULE

DETROIT, Nov. 29—Ford Motor Co. hung up another production record last Thursday with an output of 5673 engines, 4061 of which left the factory in completed cars. The company is maintaining its schedule of 4000 a day despite the fact that the five-day a week schedule is in effect and the further fact that between 6000 and 10,000 men are off at the Highland Park and River Rouge plants. Increased labor efficiency is declared responsible for the maintenance of production schedules.

FISK ON THREE-DAY BASIS

SPRINGFIELD, MASS., Nov. 27—Beginning the latter part of this week the Fisk Rubber Co. reduced the working time of its Chicopee Falls plant from five to three days a week. About 1800 employees are affected.

Car Insurance Men Find Business Good

**Sales of New Cars Have Best of
It—Revision of Rates
Probable.**

MILWAUKEE, Nov. 27—Viewed from the position of the automobile insurance man, there is a fair amount of business at the present time, somewhat more than was expected as the result of popular reports as to conditions. The insurance man, taken as a body, says that sales of new cars are having the best of it, compared to used cars. The rate with which new business is coming in is satisfactory for this season, they state.

With the election over, and the insurance man thinking about the possibilities of new legislation, the matter of rates on automobiles is receiving renewed attention.

A Milwaukee fire insurance man sums up the opinions of a conference just held privately: "Automobiles have been improved so much mechanically, that defects along these lines from our viewpoint are negligible. There is no danger of any consequence from faulty construction, whether the cars are expensive or low priced. Our records showed that most fire losses occur in garages where cars are stored. There should, in our opinion, be a flat charge for fire coverage. It is fair enough to base the collision and theft premiums upon the combined experience tables of the companies writing these two classes. We propose to make a strong fight for flat fire rates.

"Fire companies make a flat charge on dwellings. With us a dwelling is a dwelling. A particular style of dwelling is not separated out. They are all lumped and written up as a class. If we have our way there will be one class for fire insurance for which a charge of 1 per cent will be made, including cars of whatever price and cars one or two years old. We want only one other class, namely, one for all cars over two years of age, the rate on which will be 1½ per cent."

Used Cars Heavily Mortgaged

A feature causing some concern in automobile insurance circles, is the fact that many used cars bought in recent months were heavily mortgaged and bought at the higher scale of prices. As one agent expressed the matter, rather bluntly: "Let us say a man paid \$800 for a used car and insured it to cover this price. To-day he has a still older car, and meanwhile he probably can buy the same car for a good deal less money. Now, to be entirely frank, there has been an increase of fires in just such cases. Outside of this, we note a decrease in thefts of cars, doubtless due to the change in the demand, but there is still a good deal of pilfering of spare parts, inner tubes and small articles. But the marked increase has been in the number of fire losses."

Sales in November Show Little Gain

Crop Conditions Important in Mid-West—Country District Trade Excels City

(Continued from page 1137)

holding off for further drops. Dealers here have advertised heavily the fact that prices have been stabilized and will remain so for a long time. High prices for labor and material are held forth as barriers to lower prices, but trade is far below normal, although it is probably better here than in the average large industrial centers. Automobile manufacturers have greatly reduced the number of employees and are taking steps to conserve cash for conditions that will prevail during slowdown in the industry.

Milwaukee—With no scarcity of buyers, Milwaukee automobile dealers find only one serious handicap in closing, which is that the limit on trade insurance has been reached and find it impossible to extend stocks of used cars which are not moving. Salesmen are extremely hard to get. With most dealers effort is now concentrated on relieving the used car situation. State distributors are receiving orders for spring deliveries now much in advance of usual beginning of this demand. Several sales contests have been stopped because of stagnation in the used car market. The absence of owners' efforts to sell their cars through newspapers, as is usual here this time of the year, is noticeable. Financing considerably easier locally but not in State where bank funds are still tied up with farmer loans through refusal to dispose of crops at lowering prices. Every dealer is confident throughout Milwaukee and State of big spring business and leaders say that the shows in January will start the ball rolling.

New Orleans—Owing to the uncertain condition of prices on cotton, sugar and rice, retail sales of automobiles in Louisiana territory are slow, and have been slower than was expected during the past two weeks. Sales in October showed an increase of about 25 per cent over those of September, and, while the November sales are still about that far ahead of the September sales, they show little increase over those of October. Dealers believe this is due to the failure of a number of manufacturers to lower the prices of their cars, and that the buying increase shown in October was mainly in cars whose prices have been cut. These cars are still selling, but the cars whose prices have not been reduced are now showing the same activity.

Kansas City—Sales of motor cars declined steadily from early summer levels, reaching the low point early in October. Many country dealers made no sales at all in September and October. Sales conditions in cities are weaker than in the country. The absence of demand for used cars embarrasses the dealers. While banks curtail loans dealers cannot get on a cash basis in sales of new cars.

BRISCOE TAKES ON MEN

JACKSON, MICH., Nov. 27—Marked improvement has developed in the labor situation within the last week and many of the unemployed again are at work in the factories. Briscoe Motor Corp. replaced twenty-five men last week and forty this week and company officials said the force would be reinstated gradually until the plant again was in full production with its full roster of 1200 employees.

Hayes Wheel Co., and Frost Gear and Forge Co., which had laid off about 60 per cent of their employees are reinstating them gradually as improved conditions in the automobile industry indicates steady upward trend.

Sales range during November from nothing to twenty per cent of normal with a few exceptional firms selling closer to normal. There is a slight improvement in November over October. Wholesalers in other lines in Kansas City territory report collections this month good and indicating vastly larger volume of retail trade than in October when collections and sales were extremely low. Observers say that farmers are selling wheat more readily and also getting wheat moved. The abnormally low prices for hogs, cattle and grain cause a depression of spirit among all classes in this agricultural district which is more effective in retarding sales than the actual shortage of money. Two months is a comparative time limit for recovery from the spirit and adjustment of farmers and others to new conditions. It is reported that some small banks are so heavily loaned that they lack the necessary cash for daily transactions, and with smaller volume of money moving the daily deposits decline and consequently cash on hand has been in cases insufficient to meet checks of depositors having ample funds.

Minneapolis—Automobile business in this district is practically at a standstill in Minnesota and Wisconsin. In the Dakotas and Montana it is apparently dead. In the latter States farmers held their crops too long for higher prices, but in Minnesota and Wisconsin assets are in better shape because of the diversified crop. A distributor just returned from South Dakota found dealers pretty blue. As heretofore it is practically impossible to finance dealers or farmers.

Seattle—On the whole, motor car dealers in Seattle and vicinity report a gradual revival of business in recent weeks, and there is marked optimism afloat regarding the prospects for spring trade. The gloom that has enshrouded many quarters of the local trade is fast disappearing before an increasing movement of cars. One of the features of the local situation recently has been the elaborate manner in which dealers have been reducing the stocks of used cars to as low a minimum as possible in order to clear the way for a good business in new cars that is generally anticipated.

Peerless Dividend Cut to 6 Per Cent.

Action Taken by Directors to Conserve Cash—Reduces Bonded Indebtedness

CLEVELAND, Nov. 27—Stock of the Peerless Truck & Motor Corp. has been placed on a 6 per cent dividend by directors of the corporation this week. This is a reduction from a 10 per cent basis, the action coming when the directors announced that a quarterly dividend of 75 cents a share, payable Jan. 1 to stockholders of record of Dec. 1, had been declared.

The reduction was made to conserve the cash of the company, so that the corporate interests as well as those of the stockholders may be best looked after during the abnormal conditions that now prevail. A statement issued by B. G. Tremaine, president of the company, after the directors' meeting reads as follows:

"Directors of the company believe that affairs of the company are in a condition to meet the present depression in the automobile industry and to again prosper when normal conditions are restored; but they have considered it advisable to reduce the dividend to 75 cents a share for the purpose of conserving the cash of the company and to properly protect the principal which its stockholders have invested in the business.

"During this depression the Peerless Truck & Motor Corp. and its subsidiaries has continued to discount purchase invoices and has not found it necessary to use trade acceptances or to borrow money from the banks. At the close of business on Oct. 31 the consolidated balance in cash, United States Treasury certificates, maturing Dec. 15, and sight drafts deposited with banks for collection was \$2,225,570.76. Of this sum the sight drafts amounted to only \$125,387.03.

Buys Back Notes in Market

"To date this year the company has purchased on the open market and deposited with the trustee \$430,300 par value of its \$5,000,000 ten-year gold notes maturing Nov. 10, 1925. Including this year's purchases, it has now reacquired and deposited with the trustee \$2,694,850 par value of these notes. Thus more than half of the funded debt has been paid in half of the period for which the loan was made.

"A physical inventory is taken and an audit is made by public accountants at the end of each year to accurately determine the earnings of the corporation and the deductions for Federal taxes. The directors believe that this statement will show that the dividends paid this year have been amply earned and that the book value of its stock will be higher than that shown in the statement for the year 1919, which was approximately \$36 a share exclusive of patents, franchises, special reserve and good will."

French Car Exports Gain 451 Per Cent.

Ten Months of 1920 Show
\$281,405,400 Total—Imports
Off 38 Per Cent

PARIS, Nov. 27 (*By Special Cable*)—French automotive exports for the first ten months of 1920 increased 451 per cent over the corresponding period of 1919. Totals for the trading during that period of this year, officially announced, were \$281,405,400. Of that amount, \$142,219,400 were represented by passenger cars. Automotive imports into France, in contrast with this increase of exports, showed a decline of 38 per cent for the ten months period of this year.

The attempt to auction the French factory of the Continental Tire Co. on which a minimum value of 12,000,000 francs was placed, has failed as no purchasers have come forward. The belief in France is that the plant will be purchased by some of the American tire makers, but Goodrich has declared itself to be not interested. It is doubtful if others will be attracted as the factory is poorly equipped for production.

The difficulties in which the Berliet company has found itself has brought forth a plan from Berliet that the company abolish all of its founders' shares by issuing new shares to be paid for in cash. A meeting will be held shortly at which it will be determined whether Berliet can induce other holders of the founders' shares to follow him in this action.

The Austrian Daimler and the Austrian Fiat have joined forces. The new company has a capitalization of 120,000,000 crowns.

In Italy the Anti-Protectionist party of Parliament protests the recent automobile duties, declaring that they will not harm foreign manufacturers, but will seriously affect consumers. The Government reply was that their action only followed the example set by other nations, being anxious to secure uniform automotive imports with all nations.

The Allied Mission has authorized the Zeppelin companies to manufacture a giant passenger carrying monoplane of all metal construction equipped with four Maybach engines of 260 horsepower each. Breguet, it became known, is completing a giant all-metal biplane especially designed for trans-Mediterranean service. The plane is powered with four Bugatti engines on a single propeller.

MEDITERRANEAN TRADE GROWS

WASHINGTON, Nov. 26—Replies by American consular agents to questionnaires sent out by the Department of Commerce and to letters of exporters, in-

Belgian Imports From United States

Increase to 1179 Cars in Current Year

PARIS, Nov. 15 (*Special Correspondence*)—Belgium's automobile situation, completely transformed by the war, has not yet returned to normal, if a comparison is made of imports and exports for the last few months and those of the year 1913. Before the war Belgium's best customer was Great Britain, but in addition she sold cars in practically every country in the world. She imported from France, Germany and England, but received very few cars from America. Business with England has been resumed, but no business has yet been done with the Argentine, Brazil, Roumania and India. The United States, on the other hand, has jumped her imports into Belgium from 77 cars in 1913 to 1179 for the first eight months of the present year.

The following figures, which show imports and exports, together with the country of origin and destination, have been prepared by the Government commercial department:

YEAR 1913—BELGIAN EXPORTS AND IMPORTS

Country	Belgian Exports		Belgian Imports	
	Complete Cars	Chassis	Complete Cars	Chassis
Germany	74	307	124	128
United States.....	47	15	77	..
France	49	224	266	325
Great Britain.....	302	556	102	24
Italy	7	13	1	18
Netherlands	36	150	29	1
Switzerland	4	..	4	5
Argentina	412	6	..	..
Australia	49	55	..	..
Austria	27	38	..	..
Brazil	133	..	..	..
Chili	27	..	..	..
China	1	..	..	..
Cuba	28	..	..	..
Denmark	9	..	..	..
Egypt	2	..	..	..
Spain	31	29	..	..
British India.....	64	8	..	..
Dutch India.....	45	..	..	..
Japan	4	..	..	..
Morocco	3	..	..	..
Mexico	33	..	..	..
Norway	19	..	..	..
Portugal	67	6	..	..
Roumania	110	..	..	..
Russia	46	9	..	..
Siam	1	..	..	..
Sweden	21	34	..	..
South African Union.....	5	..	..	..
Uruguay	11	..	..	..

JANUARY TO AUGUST 1920—BELGIAN EXPORTS AND IMPORTS

Country	Belgian Exports		Belgian Imports	
	Complete Cars	Chassis	Complete Cars	Chassis
Germany	6	6	368	42
Spain	95	..	..	..
United States.....	3	1	1179	101
France	65	15	724	360
Great Britain.....	288	..	89	22
Italy .....	..	204	129	150
Netherlands	173	..	42	..
Portugal	108	..	..	..
Other countries.....	94	84	75	7

dicating a growing demand for American automotive products along the southern tier of Europe.

American motorcycles are becoming popular in the consular district of Patras, Greece, where the roads are too rough to permit rapid operation of other types of motor vehicles. The laws of Greece require all motorcycles to be equipped with double brakes. The road conditions do not permit the use of sidecars as the country is, in the main, mountainous.

There is a fair demand for automobile accessories in Malta where the sales of American passenger cars continue to

grow. A market exists in Saloniki, Greece, for American tires though there are no established dealers in this district. Large purchases of surplus cars and trucks belonging to the British armies afford good opportunities for the sale of tires and inner tubes.

ITALY ADDS TO ENGINE TAX

NEW YORK, Nov. 26—Italian import duties on farm traction engines weighing less than 2500 kilos have been increased by a surtax of 35 per cent ad valorem above the regular duties.

Agnelli to Remain As Fiat President

**Reconsiders Resignation Offered
in October—New Industrial
Plan Creates Restiveness**

(Special Cable)

TURIN, Nov. 29—Commandatore Agnelli, president of the F. I. A. T. automobile plant here, who tendered his resignation Oct. 28, has yielded to the appeals of stockholders and employees, and reconsidered his action. When he announced that he had resigned, President Agnelli declared that his proposed co-operative arrangement, under which the workmen took over the great automobile plant, had not been accepted in the right spirit by the workmen's organizations. Representations by employees since then has changed his position.

At the outbreak of the last dispute the directors of the Fiat company adopted a very conciliatory attitude, but despite this the strikers took possession of the factory, and were encouraged by the Government. Engineer Fornaca severely criticized the political attitude of Premier Giolitti, declaring that as a consequence the Italian industry was disorganized, no outside credit was obtainable, and there were threats of still more labor trouble.

It was because of these unsatisfactory conditions that the directors of the Fiat company offered to turn over the whole of their establishment to the workers, but this offer was refused on political grounds. As examples of the crippling influence of the present unrest, it was stated that contracts with the Italian and British Governments for the purchase of old ships, to be broken up for scarp metal, had had to be cancelled and work on the new factory had been stopped.

In answer to questions by shareholders, it was stated that a Red Guard still existed and kept a watch over the works and the offices; 40 engineers and 964 workmen had been driven out of the shops by the extremists, the directors being powerless to keep them in their situations.

Crisis Not Due to Ill Will

Signor Buozzi, secretary of the F. I. O. M., the leading metal worker's organization, declares that the present crisis is not due to the ill will of the workers, but has been caused by the tactics of the directors of the big companies. Buozzi says that since the present organization which gives the workers a voice in shop management, went into effect, the output of the Fiat factory has increased from 43 to 61 cars a day.

Manufacturers will not consent to accept smaller profits, and they do not want to admit workers into the shop committees. They are also in league with the banks to cause the withdrawals of credit from all small manufacturers. Buozzi maintains that the Fiat directors never consulted heads of departments, with the result that there was

internal mismanagement, and joint shop committees of workers and managers became absolutely necessary.

Signor Lancia, head of the Lancia company, at Turin, claims that the recent movement in Italy was not a revolution. Although output has been delayed by the disturbance, the air has now been cleared and production at the present time is on a satisfactory basis. Signor Cuneo, commercial manager of the Isotta-Fraschini company also stated that production was back to normal, and although some labor problems remained to be solved his factory was in production and there was no ground for the belief that Italy was on the point of falling into Bolshevism.

Engineer Soria, of the Fiat company, insisted that the movement was professional and not really political. The daily press had attached an exaggerated importance to the Italian outbreak, whereas the Italian automobile industry was in a more advanced condition than that of other European countries. As a proof of this, every Italian manufacturer of importance took part in the London show, and they all exhibited new models, whereas certain firms in other countries were still producing their pre-war designs.

American Cars Lead in Norway Markets

WASHINGTON, Nov. 26—Nels A. Bengtson, U. S. Trade Commissioner to Norway, in a study of Norwegian markets issued to-day declared that American automobiles and trucks are so predominant in Norway that they give a distinct American touch to the street traffic. He anticipated a decline in demand for American cars with the revival of competition by other nationalities, though the market for tractors will increase rather than diminish.

The commissioner stated that American cars have proved so adaptable to the needs of Norwegians that they will continue to hold first place despite growing competition.

The narrowness of some of the Norwegian roads creates a special demand for motorcycles with side cars and for narrow-gauge automobiles. There are nearly 8000 miles of improved highways in the country as against 12,926 miles of country roads, of which some are only bridle paths. In general the main highways are adaptable to automobile and truck traffic.

SWISS CAR DEMAND GOOD

WASHINGTON, Nov. 27—American automobiles form 40 per cent of the total number of motor cars used in Geneva and other Swiss cities. The State Department has been advised that a recent survey showed one motor vehicle for every 45 inhabitants. The demand continues to grow for the Swiss people are prosperous chiefly because of the country's neutrality. Statistics show that 2206 motor vehicles were operated Aug. 20, as compared with 1520 Jan. 1, 1920.

Truck Sales Results Unaffected by Cuts

**Same Business Conditions Re-
ported by All Manufacturers
—Car Reductions Wise**

CHICAGO, Nov. 27—Merchandising is as important in the handling of motor trucks as it is in that of automobiles, said David Thomas, general manager of the Motor Truck Manufacturers Association, in discussing conditions in the industry.

"The motor truck manufacturer has had brought home to him, in passing through the period of difficult credit," he stated, "that he must look more carefully to the merchandising of his product. That history repeats itself is a fallacy. Pre-war conditions are never to return. The pre-war conditions of the motor truck industry will never return.

"The motor truck distributor must be more than an 'order taker.' He must have sales agility and discrimination which will enable him to sell the right truck to the right party. He must have financial responsibility. The distributors of motor trucks who had these qualifications received, during the period of depression, the credit that they would have received had they been the distributors of any other equally essential commodity."

That the recent cut in prices on motor trucks did not materially affect sales is the conclusion he drew from a careful survey of the situation.

"The manufacturers of motor trucks who recently cut prices and those who recently guaranteed prices and those who did neither report like results," he said, "The automobile manufacturers who recently cut their list prices, on the other hand, report an increased volume of sales amounting in one instance to as much as 400 per cent."

The difference in results, Thomas held, is due to the difference existing between the truck industry and the automobile.

Differs from Car's Standing

"It was the recent cutting of prices in the automobile industry that started the recent cutting of prices in the motor truck industry," Thomas said in discussing this phase of the situation. "To have expected an increase in the volume of sales of automobiles at that time by reducing the list price was a correct psychological anticipation. But the conditions of the manufacture, distribution and sales of the product of the motor truck industry on the one hand and the automobile industry on the other are very different. No one will say but that the interests of the two industries overlap in many instances, but the motor truck manufacturer is liable to great error if he does not recognize the fact that he represents an industry that is essentially different from the automobile industry. The results of price cutting in the two industries drive this fact home."

Exports of Automobiles and Tires for September

COUNTRIES	Motor Trucks				Passenger Cars				Parts	Tires				All other tires
	Complete Cars		Chassis		Complete Cars		Chassis			Casings	Inner tubes	Solid tires		
	Number	Dollars	Number	Dollars	Number	Dollars	Number	Dollars		Dollars	Dollars	Dollars		
Europe														
Austria					237	333,199			1,130	1,169				
Azores and Madeira Islands					18	34,044			11,612	56,780	2,913		160	
Belgium	1	2,389	4	13,720	20	27,302			315,142	63,386	3,009			
Denmark	6	15,623	6	17,475	32	61,406			4,219	5,577	512	5,068	500	
Finland					2	6,220			70,277	172,237	241	6,125	80	
France					5	6,563			824	11,668	1,635		6	
Germany					151	94,978			3,071	9,632	14,308		97	
Gibraltar					4	3,800			1,469					
Greece	16	8,940			3	2,752			12,781	2,852	382			
Iceland and Faroe Islands					169	187,024			600					
Italy					100	176,022	1	900	13,512	130,097	13,773	7,300	54	
Malta, Gosa, and Cyprus Islands	2	8,000	5	5,322	100	176,022			34,623	68,478	5,825	3,595		
Netherlands	10	18,205	5	4,460	91	59,940			223	29,640	6,159			
Norway	26	48,539			10	24,450			6,908	8,861	64			
Poland and Danzig					3	6,625				132				
Portugal	1	5,500			91	155,602	5	16,096	20,340	46,677	2,932			
Romania			1	2,679	635	765,938	6	11,838	13,427	327,185	22,822	205	8,518	
Spain	17	36,948	139	163,859	158	257,202			3,684	24,606	2,472			
Sweden	38	89,249			25	15,110			94	2,866	241			
Switzerland					1382	1,441,894	175	205,345	2,462,515	216,774	22,193	8,842	6,691	
Turkey in Europe			38	60,462	27	33,460			1,906	4,893	600			
England	100	130,395	29	33,996	55	59,024								
Scotland														
Ireland	1	1,000												
North and South America														
British Honduras					547	766,840	11	21,047	412	158	56		53	
Canada	75	123,887	29	68,412	11	15,580			1,831,132	105,360	16,053	28,153	2,305	
Costa Rica					21	27,491	1	1,680	1,274	300				
Guatemala	1	1,062			1	625			2,001	2,429	193	58		
Honduras					3	2,628			5,110	285				
Nicaragua					27	22,927			7,091	1,496	158	124		
Panama	14	6,650			16	31,448			4,264	13,891	2,739			
Salvador	2	4,618			493	503,990	2	1,219	4,791	5,697	223			
Mexico	93	142,395	29	55,061	3	4,150			87,990	118,947	26,463	3,160	6,169	
Newfoundland and Labrador					11	11,421			2,277	856	666		55	
Barbados					31	30,342			3,407			52	131	
Jamaica			15	12,175	19	24,328			9,289	8,550	365	52		
Trinidad and Tobago	8	20,326	14	33,673	39	49,385			11,753	5,357	1,074	515	3,785	
Other British West Indies	4	2,134	1	202	2	1,325			3,070	2,998	1,324	55	65	
Cuba			34	77,227	1054	1,066,107	4	7,393	424,575	382,007	55,561	24,465	9,722	
Virgin Islands of U. S.	160	396,251			7	5,073			2,178	1,295				
Dutch West Indies									166	1,223	24	63		
French West Indies									2,497	1,691	167	800		
Haiti	2	1,020			17	14,100			1,839	2,639	2,050	326		
Dominican Republic	2	3,300	20	18,965	63	50,388	1	2,500	15,378	20,039	3,110	2,703	1,372	
Argentina	9	14,208	11	33,526	409	555,640	2	6,500	688,878	428,582	40,109	4,158	4,918	
Bolivia									207	90				
Brazil	75	61,071	10	16,785	251	416,838			248,518	111,795	36,372	5,550	2,456	
Chile	4	9,133	1	7,000	18	49,385			15,144	8,561	919	562	2,548	
Colombia	18	19,876			56	84,208	1	600	25,104	8,859	1,795	20	248	
Ecuador	2	4,550			4	7,622			948	255	44			
British Guiana			1	690	5	5,525			2,437	805	935			
Dutch Guiana					2	5,770			6,276	120				
Paraguay									1,792					
Peru	10	33,335	8	11,233	29	40,407			32,445	10,351	1,998	2,639		
Uruguay	10	5,760			387	407,978	31	21,022	35,087	110,421	13,960		638	
Venezuela	4	1,750	3	6,555	58	62,342			8,120	20,757	3,189	54	160	
Asia and Far East														
Aden					5	8,223			769	3,158	349			
China	18	26,605	17	17,024	50	124,019	2	8,545	37,268	28,145	2,232	146	246	
Kwantung, leased territory										248				
Chosen									1,737		663			
British India	46	90,048	103	213,694	940	1,159,882	3	10,611	128,278	56,148	8,533	4,170		
Straits Settlements	19	35,636	6	11,600	245	289,529			64,843	139,283	3,195	14,664		
Other British East Indies					33	45,025			11,247					
Dutch East Indies	12	27,603	11	24,459	113	164,667	1	3,600	51,430	137,035	5,575	64,100	1,498	
French Indo China	2	1,984			34	45,054			2,167					
Hongkong	1	3,712	1	2,000	32	68,143			1,434	905				
Japan	15	53,139	16	33,032	55	98,934	30	40,777	26,290	36,369	4,527	1,600	4,249	
Persia					15	9,900				912	1,461			
Russia in Asia									2,099					
Siam	4	4,965			1	1,350			604			290		
Turkey in Asia	1	2,970		1,856	10	11,935	1	2,550	1,560	3,721	3,656			
Australia	17	46,572	67	114,493	156	208,059	484	417,070	162,444	150,188	7,965	12,080	8,453	
New Zealand	19	46,923	28	46,324	439	571,667	27	41,343	126,719	216,883	9,088	41,872	5,031	
Other British Oceania					8	10,445			722	2,747	345			
French Oceania	1	2,900	1	2,833					990	2,573	376		298	
Other Oceania						1,693			2,413	197	70	190		
Philippine Islands	88	100,222	94	173,174	296	390,482			92,928	235,678	35,745	27,807	956	
Africa														
British West Africa	14	20,839	8	18,648	4	4,463	7	15,284	23,199	56,702	13,031			
British South Africa	19	41,241	9	10,941	353	451,702	5	6,247	94,208	237,139	39,673	469	5,620	
British East Africa					4	11,130			1,017	105	20			
Canary Islands					5	9,691								
French Africa									37					
Kamerun, etc.									52	9,386				
Morocco					2	2,800				329	50			
Portuguese Africa					11	23,203			2,763					
Spanish Africa									219	6,517	144			
Egypt					55	41,900			7,252					
Total	987	1,721,473	760	1,313,555	9631	11,705,929	800	842,167	7,311,951	3,883,923	446,352	271,573	78,597	

October Exports Continue Climbing

Lead September by Over \$5,000,-
000 and October, 1919, by
About \$7,000,000

WASHINGTON, D. C., Dec. 1—Statistics compiled by the Bureau of Foreign and Domestic Commerce to-day show tremendous increases in the volume of exports and imports of automotive equipment for October and the nine previous months of this year. A total of 121,787 passenger cars valued at \$139,096,244 were exported since January as compared with 52,189 cars valued at \$57,458,726 for the same period in 1919.

During October this year 11,562 passenger cars valued at \$14,699,402 were exported as against 7898 cars valued at \$8,634,965 for the same month last year. The exports of commercial cars for October, 1920, amounted to 2432 cars valued at \$4,018,126, as compared with 1301 cars and a value of \$2,931,204 for October, 1919. The ten months' total for this year was 24,546 commercial cars with valuation of \$38,610,983. The physical volume of truck shipments was doubled for in the corresponding period last year 12,392 commercial cars were sent abroad with a valuation of \$29,746,033.

Parts, not including engines and tires for October, 1920, were valued at \$6,910,538 or about 100 per cent increase over the same month last year when exports totaled \$3,525,115. The ten months' total this year of these parts amounted to \$69,337,409 or more than doubled the total for the ten months of 1919, when exports were valued at \$33,921,088.

In both passenger cars and trucks clear gains are shown over September this year; this amounting to about \$4,000,000 in cars and \$1,000,000 in trucks.

N. A. C. C. to Advertise Essentiality of Cars

NEW YORK, Dec. 3—The directors of the National Automobile Chamber of Commerce decided at their monthly meeting here yesterday to appropriate a substantial sum with which to carry on an advertising campaign in New York and Chicago during the show periods to demonstrate the essentiality of motor vehicles as transportation. The aim of the advertising will be to convince bankers and business men in all lines that motor cars are indispensable as utilities. A by-product of the campaign will be the good it will do the dealers in the territory surrounding the two large cities.

The directors also decided to appoint a tax committee which will review the entire tax situation as it relates to the automotive industry so that proper presentation of the subject can be made to Congress when the subject of taxation is taken up.

Incomplete reports for the month of November showed that 13,000 carloads of

UNJUST TO OPPOSE PRICE REDUCTIONS

SYRACUSE, Nov. 29—Syracuse Rubber Co., Inc., manufacturers of Syra-Cord tires, have made a 12½ per cent reduction in the price of Syra-Cord tires and a 15 per cent reduction on tubes.

"We decided to make this reduction," says J. B. Losey, general manager, in commenting on the fact, "to do our bit toward bringing the country back to a pre-war basis. We feel that any manufacturer who holds out against this movement when he can possibly sell his product for any less is impeding progress and doing an injustice to the country."

automobiles were shipped in that month by the manufacturers of the country, together with 6000 driven away and 1000 transported by boat. This, compared with 26,690 carloads shipped in November of last year, 10,000 driveaways and 2059 shipped by boat. Carload shipments for October numbered 17,186, as compared with 29,843 for October, 1919. Driveaways in October numbered 14,101, as compared with 13,402 in the previous October.

Fiat Reduces Prices On All New Models

NEW YORK, Nov. 30—Price reductions will go into effect on all Fiat motor cars on Dec. 1. The new prices will be as follows, c. i. f. New York, war tax excluded:

Model 501—Chassis, \$2,300; touring, \$2,575; sedan, \$3,275.

Model 505—Chassis, \$3,200; touring, \$4,600; landaulet, \$5,200.

Model 510—Chassis, \$4,100; touring, \$5,720; landaulet, \$6,450; limousine, \$7,185; sport chassis, \$4,300; sport touring \$6,250.

Metropolitan sales office and show-rooms are being opened at 150 West Fifty-seventh Street, where it is planned to show all new models. General offices of the company will be continued at 501 Fifth Avenue.

NASHVILLE BUYS "OLD HICKORY"

NASHVILLE, TENN., Nov. 26—"Old Hickory" powder plant at Jacksonville, twelve miles east of Nashville on the Cumberland River, has been purchased from the Government by the Nashville Industrial Corp., composed of Nashville business men. It is to be developed into a manufacturing center, having available immense housing and manufacturing building facilities.

This was the largest Government manufacturing undertaking during the war, costing \$87,000,000. It occupies 5000 acres.

Firestone Reduces Salary Schedules

Ten Per Cent Drop Simultaneous
With Dividend Cut and Pro-
duction Decrease

AKRON, Nov. 30—Official announcement was made to-day by H. S. Firestone, president of the Firestone Tire & Rubber Co. of this city, of a ten per cent reduction in salaries of all employees, effective Dec. 1, and of a reduction also in the company's dividend rate from \$2 to \$1.50 per share per quarter.

Although practically all rubber industries in Akron for several months past steadily have reduced wage scales by reducing factory operating forces and then re-employing men at a much lower scale, this is the first salary cut to be announced. Whether it will be followed by other tire companies in Akron was a matter only of conjecture. In Akron to-day no announcement was forthcoming from any other tire concerns nor would officials of other companies comment upon the action of the Firestone officials.

Also effective Dec. 1, it became known to-day, the Firestone factories will start working on a basis of 25 hours a week or five hours a day on a five day week. This reduction in operating schedules is in addition to heavy reduction of factory operating forces during the past weeks.

"In announcing this reduction for salaried employees, the Firestone Tire & Rubber Co.," reads the official announcement, "has given full and careful consideration to every phase of the present economic situation. Conditions have necessitated a retrenchment in every line of production. Salaries came last but could not be excepted. It is only fair in making this announcement that attention should be called to the fact that at the same time the company also reduced the returns on the money invested in the business, in other words, the dividend rate from \$2 to \$1.50 per share per quarter, which means that the income of capital was reduced 25 per cent.

"The operation of the law of economics cannot be avoided by artificial support of the pay envelope. The same conditions that have caused this salary reduction are also operating to reduce the cost of living. Commodity prices have come down somewhat already and there is every indication that they will continue to decrease for an indefinite period.

Had Increased 20 Per Cent

"During the past twelve months the Firestone company increased salaries 20 per cent. It met the increased cost of living to its employees last January with a raise of 10 per cent and added another 10 per cent last April when the peak of high prices was reached. It has now asked its salaried employees to accept a reduction commensurate with the demands of good business principles and the present economic conditions. They have co-operated appreciatively."

Templar Is Cleared, Suit Angers Court

Application for Receiver and Intent Branded as Serious Moral Crime

CLEVELAND, Nov. 30—Application for the appointment of a receiver for Templar Motors Corp. by J. W. Wilson, a stockholder of the company, was dismissed to-day in Common Pleas court by Judge Levine, who branded the application and the intent back of it as just as serious a moral crime as causing a run on a bank.

Wilson had asked for the appointment of a receiver alleging fraud, deceit and mismanagement of the affairs of the company. The company made a general denial and asked that the application be brought to immediate hearing. In filing his application Wilson had not done this.

After hearing the evidence in the case and dismissing the action, Judge Levine said:

"I hold that to file a petition alleging the grossest kind of accusations against a perfectly solvent firm for the purpose of creating suspicion in the mind of the public concerning its affairs, and without any actual ground for the same, is morally just as much of a crime as causing a run on a bank. The bar association through its proper agencies will see fit to look into this matter and if it is brought to my attention that any attorney at this bar had, without proper cause, but merely to carry out the design of a scheming client, prepared a petition containing these allegations of fraud, deceit and mismanagement, well knowing that the same were not true, I would then promptly and without hesitation, say that the severest sort of discipline shall be applied to such attorney."

Wilson had alleged that the company had never been on a paying basis, but had paid eight quarterly dividends from money received from the sale of stock.

Assets Exceed \$8,000,000

M. F. Bramley, president of Templar, said the filing of such a petition was absurd, and that the condition of the company did not warrant such action. "Our company has more than \$8,000,000 assets," he said. "Our outstanding indebtedness is not more than \$600,000. At present we have on hand \$1,000,000 in finished cars. Two months normal business and every dollar of indebtedness would be wiped out. The condition of our business is far from being as represented by Wilson. The suit was filed to injure the reputation of the corporation."

A faction of the stockholders have been complaining about the company's management and several meetings of stockholders have been held. At one of these in Columbus there was a stormy scene which wound up in a vote of confidence in the management after Bramley had read a statement of the company's operations and financial condition. At a subsequent one in Cleveland handbills were

distributed denouncing the management and discussing company finances. This meeting likewise ended in a vote of confidence in the officers.

Attorneys Walter D. Meals and John H. Orgill, on behalf of Templar company, filed a motion to advance to immediate hearing the application for the appointment of a receiver.

Meals said many millions of dollars have been invested in the company, and that a large number of persons, including creditors, are vitally interested in its welfare. The pendency of the action jeopardizes the investment rights of the creditors, he said, and is a menace to the business of the concern.

Airplane Seizure Is Mystery Here

(Continued from page 1136)

much to be desired supremacy of the air.

The arrival of the all-metal Junker plane upset the plans of the War and Navy Departments and held up the awarding of contracts to American manufacturers. It now has been demonstrated, however, that the eight Junkers purchased by the Post Office Department did not make an enviable record in actual performance. Here is the actual record of their performance:

No. 301—Flew 4965 miles and was withdrawn.

No. 302—Flew 1080 miles and was withdrawn.

No. 303—Flew 3360 miles and was withdrawn.

No. 304—Flew 1365 miles and on Aug. 20 Pilot Max Miller nearly lost his life when it caught fire in the air.

No. 305—Flew 1940 miles and on Sept. 1 crashed in flames, killing Miller and his mechanic.

No. 306—Flew 2125 miles and was withdrawn.

No. 307—Flew 755 miles and was withdrawn.

No. 308—Flew 530 miles and then crashed in flames, causing the deaths of Pilot Stevens and his mechanic.

The eight machines flew a total of 16,120 miles, caused four deaths and had a half-dozen crashes. They were overhauled by the Post Office Department and it was found they had no less than 34 connections in the hood, any one of which might have caused disaster. The air mail service now has cut out all but one of these connections and removed all the rest to a box under the fuselage. The planes were purchased over the counter for \$30,000 each without tests.

TO FINANCE DODGE DEALERS

NEW YORK, Nov. 30—The Bankers' Commercial Security Co. of this city, which hitherto has financed only truck dealers, has entered into a contract with Dodge Brothers Motor Car Co. to finance Dodge dealers. The company is taking up cars for dealers both on the storage and retail plans. Dodge is now working three days a week, making 625 cars a day. Reports of the number of completed Dodge cars in the hands of dealers are said to be much exaggerated.

Wilson Restrained in Steel Body Suit

Temporary Order Issued Pending Final Decision—Employees Held for Testimony

DETROIT, Nov. 30—C. Haines Wilson, treasurer and general manager of the C. R. Wilson Body Co., and Paul Breneman, a Wilson employee, have been ordered to appear before the Federal grand jury in connection with an alleged infringement of an all-steel body patent of Edward G. Budd Co., Philadelphia, and wrongful use of Budd blue prints. Both men were ordered held in \$5,000 bail to await the action of the grand jury.

The order for their arrest resulted from testimony in the infringement case to the effect that Breneman was former chief draughtsman for the Budd company and left that organization with several assistants at the instigation of Haines Wilson. It was asserted that Breneman took with him blue prints which are alleged being used by Wilson to develop all steel bodies infringing the Budd patents.

At the hearing Oct. 2 Breneman denied bringing blue prints with him to the Wilson company and Haines Wilson disclaimed knowledge of an attempt to acquire ideas from such blue prints or from other information wrongfully. Subsequently, according to Judge Tuttle, Breneman admitted bringing certain blue prints which have disappeared. Attorneys for the Wilson company said no all-steel bodies built under Breneman's supervision have been put into production, but were submitted only to automobile manufacturers.

The hearing on the infringement case was continued and a restraining order issued under which the Wilson company is enjoined from using the name "all steel," and from enticing or soliciting Budd employees to leave. It is also restrained from using patterns or designs alleged stolen from Budd and from infringing any Budd patents. The Wilson company is also ordered to return any blue prints or drawings of the Budd company now in its possession.

Air-O-Flex Petition Filed by President

DETROIT, Nov. 29—G. M. Walker, Jr., president of the Air-O-Flex Automobile Corp., has filed a petition asking that the company be declared bankrupt. Liabilities of \$21,344.12 are listed and assets of \$19,300.88. The petition declared that stockholders refused to attend meetings and asked that the affairs of the company be wound up.

The assets include two experimental trucks valued approximately at \$16,000. Cash balance in the bank totals \$2.56.

The corporation was organized in Delaware in 1917 with a capital of \$2,500,000, to build trucks with Air-O-Flex suspension cylinders instead of springs. It was given permission to sell \$2,300,000 stock.

Connecticut Checks Heavy Truck Use

Will Issue Special Permits for Winter Operation—Owners Protest Drastic Act

NEW LONDON, CONN., Nov. 27—Effective from Dec. 1 to May 1, operators of trucks weighing five tons or more, or where the combined weight of truck and load is in excess of 10 tons, will be refused use of the State highways, unless under special permit and traveling under certain conditions, according to the edict of State Highway Commissioner Bennett this week. It is stated that the 10-ton ban would virtually bar trucks of five-ton model from winter use on State highways, dealing a crippling blow to the thriving ship-by-truck industry.

Already a storm of protest has arisen with truckmen, automotive dealers and associations, chambers of commerce and allied organizations in the lead. A conference of protest and an attempt to secure amendment of the ban was held at Hartford yesterday and was attended by many interests.

Commissioner Bennett's contention was that the operation of trucks of five-ton or more weight or trucks and loads weighing 10 tons or more is ruinous to highways and bridges during the winter season. He explained that the ruling will only be in effect between Dec. 1 and May 1, and that permits will be issued to the operators of heavier trucks allowing use under certain conditions. Applications for the permits must be made to the State motor vehicle department at once.

Under the ruling, it will be necessary for the owner of a five-ton or over truck to state on what highways he intends to operate. At any time, if the condition of the highway, in the opinion of the commissioner, is such that the continued operation of the heavier trucks over it will prove injurious, the permits will be revoked, either temporarily or for the balance of the closed season.

Contents Limitations Beneficial

Commissioner Bennett explained to the protestants that he desires to co-operate with them and that the new order will work to their benefit, as well as to the benefit of other users of the State highways. Permits will be ready for issuance Dec. 1 to operators of trucks of five tons or over. The State motor truck department is having built numerous small sheds, or offices, along the main highways of the State, at which representatives of the department will be on duty day and night.

Representatives of the owners of trucks and other protestants have made an effort to have the permits issued by the various local chambers of commerce. Commissioner Bennett has refused to comment on this point, stating the department would co-operate with oper-

ators to the utmost of its ability and that he believes details would work out to the satisfaction of all.

In addition to representatives from practically every city of the State, representatives of the National Automobile Dealers Association, National Automobile Chamber of Commerce and National Motor Trades Association attended the protest meeting.

Automotive, industrial and allied organizations of New England are being brought into line to support legislation, whereby trunk highways will be kept free of snow and in a condition fit for travel during the winter months. Development of the ship-by-truck movement and increasing use of passenger cars during the winter months have, it is contended, made some action of this nature necessary.

Hurlburt Solvent, to Continue Company

NEW YORK, Nov. 29—Although two bankruptcy petitions had been filed against it, a jury in Judge Hand's part of the Federal Court has decided that Hurlburt Motors, Inc., is not insolvent. The testimony disclosed that the company had been making money while in control of the receiver, that a net profit had been earned, and that the action to put the company into bankruptcy followed the purchase by the Harrisburg Mfg. & Boiler Co. of assets of the old Hurlburt Motor Truck Corp. from Landon P. Marvin, receiver.

Immediately after the verdict directors of the company arranged for a meeting to-morrow to complete arrangements for taking over the property.

CREDITORS CONTROL DYNETO

SYRACUSE, N. Y., Nov. 30—Federal Judge Ray has appointed a committee of creditors to take over the affairs of the Dyneto Electric Corp., manufacturers of starting and lighting systems, with service stations in all the larger cities of the country. No estimate has been made of the assets and liabilities, but the company is said to be thorough solvent and it will be kept in operation unless something entirely unexpected develops. The creditors' committee is headed by Charles H. Sanford of the National Bank of Syracuse.

BALES RECEIVER APPOINTED

INDIANAPOLIS, Nov. 29—Thomas K. Simpson, president of the Bales Mfg. Co., manufacturers of a puncture plugging compound, has been appointed receiver for the company by Judge Carter of the Marion Superior Court on petition of Okla. H. Hershman. The complaint charged that the company was in danger of insolvency. Simpson was ordered to continue the operation of automobile service stations at Muncie and Dunkirk, Ind.

Willys Pays Scrip to Meet Dividend

Preferred Stockholders Get Ne- gotiable One-Year Notes— Suspend Financing Plan

NEW YORK, Dec. 1—Preferred stockholders of the Willys Corp. have been notified that the dividend due to-day on the stock would be paid in the form of negotiable one year scrip. This will be callable at par and payable to stockholders of record Nov. 29. The scrip dividend was decided upon to conserve cash assets and credit resources.

A statement of earnings accompanying the announcement shows net profits for the eight months ended Aug. 31, before allowing for taxes, were \$3,604,600 as compared with \$4,141,255 for the full year of 1919. It is conceded that the profits for the last four months of this year will not add appreciably to those for the first eight months. This would be equal to 2½ times the first preferred dividend.

It was stated that operations at the Toledo, Syracuse and Poughkeepsie plants increased until Sept. 1, but that there had been a very marked decline since that time.

No formal statement has been made on the subject, but it is understood negotiations looking toward a bank loan of some \$30,000,000 for the Willys-Overland Co. have been suspended for the present as the time is not considered opportune. No immediate action is necessary and when the subject of new financing is taken up again it would not be surprising if it covered all the ramifications of the so-called Willys interests, including the Willys Corp. and the Willys-Overland Co. as well as their subsidiaries. Some action in this direction is contemplated, but the utmost reticence is being maintained in regard to its exact nature.

Small Company Asks Acceptance of Notes

NEW YORK, Nov. 30—The William Small Co. of Indianapolis, which is operating under a State court receivership, has invited its creditors to accept non-interest bearing notes in settlement of their claims and permit the lifting of the receivership. An involuntary petition in bankruptcy was filed against the company last September by two creditors, but Judge Anderson found the company was solvent and discharged the receiver. The action in the State courts then was instituted. It was understood that 85 per cent of the creditors had agreed to an extension of one year. Under the plan now proposed claims of less than \$100 would be paid in cash and notes would be given for the balance, running up to four years maturity in the case of the larger claims.

Du Ponts Make Up Powerful Group

Activities Extend to Many Industries

Explosives Manufacture Foundation of Wealth—Turn War Plants to Peace Pursuits

NEW YORK, Dec. 1.—The famous du Pont family of Delaware, which now has come into almost complete control of the General Motors Corp., makes up one of the most powerful industrial and financial groups in the United States. They are best known as manufacturers of explosives and this business brought them, collectively, enormous wealth. They have been steadily branching out of recent years, however, and investing heavily in many lines.

General T. Coleman du Pont, former United States Senator from Delaware, is more widely known than Pierre, who has supplanted W. C. Durant as president of General Motors, but is no more powerful in the industrial world. Besides being the directing head of the greatest automotive combine, he is a director of all the du Pont corporations and these large companies:

American International Corp., Bankers Trust Co., Chatham & Phenix National Bank and the Philadelphia National Bank.

T. Coleman du Pont's directorates include the Empire Trust Co., of which he is chairman of the board; Equitable Office Building Corp., of which he is chairman of the board; Greeley Square Hotel Co., Industrial Finance Corp., Morris Plan Bank, of which he is president; National Surety Co. and Thompson-Starrett Co.

Because of the magnitude of profits from war materials, the E. I. du Pont de Nemours & Co. was organized in 1915 to take over the assets of the E. I. du Pont de Nemours Powder Co., for which it paid \$120,000,000. These assets included 22 powder plants, nine paint and varnish plants, one paper mill, two charcoal plants, one alcohol factory and five plants for the manufacture of pyralin products.

Investigate New Projects

The du Pont Engineering Corp., capitalized at \$7,000,000, formed to operate a powder plant at Nashville, Tenn., was continued after the war to investigate many new projects to supplement the former enterprises of the du Ponts. Several investments already have been made, including the pyralin celluloid products and the various paint and varnish factories.

While seeking investment for war profits, the du Ponts found that General Motors appealed to them and the du Pont American Industries Co. was formed in January, 1916. The original purchase

amounted to 27 per cent of the General Motors stock.

The du Pont Chemical Co. was formed in December, 1918, to purchase the military powder plants of the du Ponts. After the war all these factories were sold to the du Pont de Nemours company. The Hopewell, Va., property is the only one without a peace time occupation.

Hotel holdings acquired by the du Ponts since the war probably aggregate more than those of any other group in the country and include some of the best known and most fashionable in New York. They also own 30,000 acres of agricultural and timber lands in St. John's and Volusia counties, Florida, with fifteen miles of railroad, saw mills, turpentine plants, etc.

There are no biographies of Pierre du Pont. He has been overshadowed by Coleman until recently. He was graduated from the Massachusetts Institute of Technology in 1890 and then went to work in the du Pont organization. Later he headed a number of small steel companies and then took up his share of the family affairs. He was married in 1915 to Miss Belin of Scranton, Pa., and they have one daughter. He is much averse to publicity.

Receivership Lifted from Fort Wayne Tire

INDIANAPOLIS, Nov. 29.—The Fort Wayne Tire & Rubber Co. of Fort Wayne, Ind., has been taken out of receivership by Judge Anderson in Federal Court here. Some time ago the Lincoln Trust Co. of Fort Wayne was appointed receiver for the concern.

The court, on an agreed order, also issued a temporary injunction restraining John C. Brown of Fort Wayne, president of the Fort Wayne Tire & Rubber Co., and Louis E. Kraft of Fort Wayne, secretary and treasurer of the company, from selling stock on commission and from doing other acts complained of in the original bill of complaint.

It was also provided in the injunction that the board of directors shall be increased by the addition of six new members. The board is now composed of five members. Brown and Kraft were also ordered not to vote in the election of directors, \$100,000 worth of stock held by them, their possession of which is questioned by the plaintiffs.

INCREASES CAPITAL STOCK

BRIDGEPORT, CONN., Nov. 27.—Liberty Mfg. Co., manufacturer of an air-cooled engine, has filed a certificate of increase in capital from \$250,000 to \$3,000,000. The company, a new concern, has just completed a large factory at Stratford, just over the Bridgeport one, which is soon to be in operation.

Durant to Retain Place as Director

Divisions Whip Inventories Into Shape—Working Capital of Company Very Large

(Continued from page 1136)

trucks, tractors and agricultural machinery. There was little chance for development along these lines, however, before the bottom dropped out of business.

There has been a very marked reduction in the last few months in the enormous General Motors inventory and the attention of the various divisions has been devoted to placing themselves in a strong financial position. This has been brought about successfully. The company had a working capital of \$150,000,000 on Jan. 1, of which \$110,300,000 was in cash and investment securities. Its cash position probably has been strengthened since that time and it will be further enhanced by the payment due to-day of approximately \$33,000,000, the balance due from purchase of 1,800,000 shares of common stock by British and Canadian investors. Final payments also are due to-day from persons who subscribed to the remainder of the common issued last June, approximating 1,500,000 shares.

There is no reason to suppose Explosive Trades, Ltd., of London, and Canadian Explosive Trades, Ltd., will fail to complete their payments. A cable message from London to AUTOMOTIVE INDUSTRIES says that the British company is well financed and abundantly able to meet the obligation. The only cloud on its horizon is the fall in the shares of Dunlop Rubber, which it controls.

Morgans Potent Influence

The cash and investment holdings of the du Ponts are exceeded only by those of the United States Steel Corp. On the surface, at least, the du Ponts own 51 per cent of General Motors Stock, for it was announced that the approximately 3,000,000 shares purchased from Durant last week merely were underwritten by the Morgans and that the stock would be held by the du Pont Securities Corp. The Morgans will exercise a much more potent influence in the company than this would seem to indicate, however.

Any statement as to the future of Durant is purely speculative. His friends believe, however, that he may again become an important figure in General Motors through election to the chairmanship of the board. There may be significance in the fact that both this office and the presidency now are held by Pierre du Pont, which is rather unusual.

Durant still owns or controls a very
(Continued on page 1148)

Ryan Difficulties Not Serious to Stutz

Dumping of Collateral on Market
Not Anticipated—Directors
Hold Meeting

INDIANAPOLIS, Dec. 1—An unheralded visit was made to the Stutz motor plant one afternoon last week by Allan Ryan and Charles M. Schwab, it was learned to-day. They were at the factory only a few hours but inspected it thoroughly. The visit is regarded here as significant and is believed to presage announcement that Ryan's holdings in Stutz have been transferred to Schwab. President Thompson has gone to New York for a special meeting of the directors to-morrow.

NEW YORK, Dec. 1—No confirmation was obtainable here to-day of the reported transfer of Ryan's stock in Stutz to Schwab. They have been closely associated in several companies in the past, however.

NEW YORK, Nov. 30—No serious difficulties for the Stutz Motor Car Co. of America is expected in financial circles here to result from the taking over by a committee of bankers of the affairs of Allan A. Ryan, chairman of the board of the Indianapolis company. Ryan's spectacular corner in Stutz stock last March brought it prominently to public attention and as a consequence his name has been intimately associated with it.

Announcement late last week that the banks, headed by the Guaranty Trust Co. and the Chase National, had undertaken the conservation of Ryan's assets was not entirely unexpected. When the governors of the Stock Exchange ruled Stutz off the big board as the result of the corner Ryan began litigation against them and his suit still is pending. He resigned from the exchange and his seat was sold. The Stutz stock now is listed on the curb and the last quotation there was \$100 bid with \$200 asked.

Liabilities Approximate \$16,000,000

Ryan's financial difficulties are due to the rapid decline in securities pledged as collateral for bank loans. This alarming shrinkage led to action by the banks. The liabilities involved approximate \$16,000,000. It is believed the assets considerably exceed this sum. The loans were negotiated by Ryan in his financing of various companies in the past year and a half. These corporations include Stutz, Stromberg Carburetor Co., Continental Candy Co., Chicago Pneumatic Tool Co. and Hayden Chemical Co. He retired some time ago from Stromberg.

It was popularly supposed Ryan had cleaned up about \$1,000,000 on the Stutz corner but this was largely a paper profit. He bought the stock all the way up from \$150 to \$400 a share. The settlement price for the shorts was \$550 and in the

outside market it rose as high as \$700.

Ryan is understood to have worked in entire harmony with the bankers until last Friday when he suddenly turned against them. He tried to enlist the aid of Comptroller of the Currency Williams, who has denounced New York banks for the high rates of interest on call money and announced that he would retain Samuel Untermyer as his attorney if the famous lawyer would accept. It is considered possible, also, that his millionaire father may come to his assistance.

Should the bankers retain control of Ryan's stock, pledged as collateral, it is stated on the highest authority that the securities will not be dumped on the market for whatever they will bring, especially in the case of Stutz, which is said to be in a rather enviable position. The stock either will be held until it can be sold for something like its real value or it will be sold to some one who will have the best interests of the company and its stockholders at heart.

Stutz a Favorite Interest

On the other hand, if Ryan succeeds in paying his bank loans and getting control of his collateral, no one can tell what his course will be. It should not be forgotten, however, that Stutz has been one of his pet interests and it is not considered likely he will leave it in the lurch. Ryan has had a somewhat spectacular career in the financial world and has a reputation as a fighter who is abundantly able to take care of himself.

There are outstanding 200,000 shares of Stutz stock of no par value, including 100,000 shares issued as stock dividends early this year. The stock was increased from 75,000 shares to 100,000 in August, 1919. The quarterly dividend rate has been \$1.25 a share. It is understood Ryan owns about 80 per cent of the stock.

There has been much discussion of the present value of Stutz stock. Its net profits last year, before depreciation and taxes, were \$892,000. Facilities were provided for increased production this year but the slump in the market has decreased the demand for cars as is the case with all other companies. The prices of Stutz cars were not cut but increased when others were marking down their lists. A market value of as low as \$50 a share would give the capitalization a value of \$10,000,000. One of the chief difficulties is that there has been nothing but an artificial market for the stock since it was stricken from the exchange.

President W. N. Thompson of the Stutz company arrived in New York to-day to attend a meeting of the directors Thursday. Before leaving Indianapolis he said he did not see how the Stutz company would be embarrassed by Ryan's difficulties.

UNION STEEL CUTS PRICE

DETROIT, Nov. 30—Notice has been issued to the industry by the Union Drawn Steel Co., Beaver Falls, Pa., through its Detroit office, of a reduction of 15 3/10 per cent in the base price of cold drawn steel effective to-day. The new price is \$3.60 per 100 lb., a reduction of about \$18 a ton.

METAL MARKETS

HOW long will the independent steel interests be able to maintain their prices on a parity with the U. S. Steel Corporation's levels? That is the question which is uppermost in the minds of those who follow the steel market's trend. The answer depends entirely upon the motive that prompted the leading interest among the independents to make announcement of the downward revision of its prices to the United States Industrial Board's scale which the Corporation has adhered to since March, 1919. Either there is some actual business in sight and the Jones & Laughlin Steel Co. felt that at the same price the independents would have a good chance to land it, or else the reduction is in the nature of a trial balloon for the purpose of testing to what extent buyers will respond. While there is every indication that automotive consumers are sounding the market with a view to placing orders for moderate tonnages, this abeyant demand appears to be largely for sheets for which independents continue to quote, nominally at least, varying premiums over the Corporation's prices. There is no question that many of the smaller independent interests are getting to be harder up for orders from day to day, and, if these orders, at least in many instances, are not to go to swell the Corporation's unfilled tonnage, they must be booked at prices lower than those of the Corporation. Judge Gary's announcement of a few weeks ago that the Corporation's subsidiaries would adhere to prevailing prices makes it reasonably certain that the year 1921 will open with the Corporation's prices as the maximum levels from which there will be discounts in numerous transactions between independents or resellers and consumers.

Pig Iron.—The market continues to drift. There has been some talk of the possibility of bringing in Belgian pig at prices several dollars below prevailing nominal quotations. Pig iron interests appear to be in a somewhat more reasonable frame of mind and admit that eventually the market will settle at somewhere around \$30, Valley, i. e., provided continually exorbitant coke prices give way.

Steel.—Middle West rolling mills specializing in automobile sheets are now eager for business at around 6.85c., or \$20 a ton below the price quoted a few weeks ago. With sheet bars obtainable at around the Corporation's price of \$47, the sheet market is tending lower and lower, although independents claim that they simply cannot make both ends meet at the conversion rate which the Corporation's sheet prices imply. The independents, generally, look for an active sheet demand early next year and show considerable confidence in a continuance of modest premiums on sheets over the Corporation's levels. Cold rolled strip steel could be secured to-day on firm bids of 7c. and hot rolled strip at 4c.

Aluminum.—Some importing interests, believing that one of the first commodities on which the incoming Congress will advance import duties will be aluminum, are inserting clauses in their sales contracts that any advance in duty is for buyers' account. Foreign virgin metal is offered at as low as 26c. for 98 to 99 per cent virgin ingots.

Copper.—Following sales of electrolytic at as low as 13 1/2c., the market is a shade steadier. Producers are busy cutting production and wages.

Tin.—American 99 per cent tin has been sold at as low as 33c.

Lead.—The market has sagged further and is now a 5 1/2c. affair, both New York and East St. Louis basis.

INDUSTRIAL NOTES

Oshkosh Motor Truck Co., of Oshkosh, Wis., expects to complete the transfer of its operation from its old plant on Forest Avenue into its new works on Oregon Street shortly after Dec. 1. The present investment in plant and equipment is in excess of \$250,000. A local syndicate financed the construction of the new factory. Payments by the truck company on the contract account already are considerably in excess of the requirements.

Lincoln Light Corp., Milwaukee, has been organized with a capital stock of \$250,000 to manufacture and deal in generating systems, fixtures, appurtenances, etc. The incorporators are Adolph, James and Herbert Mahler, 219 Twenty-eighth Street, Milwaukee.

Duplex Storage Battery Co., originally established in Milwaukee a year ago as a manufacturer of storage batteries and now operating in its new plant at Beaver Dam, Wis., has been reincorporated in Delaware with an authorized capitalization of \$600,000. The investment in Wisconsin is \$75,000. Peter Kettenhofen, formerly superintendent of the Malleable Iron Range Co., of Beaver Dam, has become associated with the Duplex company as business manager. William Petschel is president and chief engineer.

Stewart-Warner Speedometer Corp. is completing additions to its plants which cost \$1,000,000. The corporation is about to place three new Stewart accessories on the market.

C. L. Best Gas Traction Co. has changed its name to the C. L. Best Tractor Co. Net profits for the nine months ended Sept. 30 were \$533,451. The balance sheet shows profit and loss surplus of \$827,253 and total assets and liabilities of \$2,715,320.

Hartford Battery Mfg. Co. is now assembling 100 batteries a day at its San Francisco branch known as the Guarantee-Hartford Battery Co.

Kelley Tire & Rubber Co. factories are nearing completion at West Haven, Conn. Production is expected to start soon after Jan. 1.

General Motors Acceptance Corp. offices have been moved from Broadway and Fifty-seventh Street, New York, to 120 West Forty-second Street. The General Motors Export Corp. offices are also in the new building.

Main Electric Co., Cleveland, has reduced prices on its main electric lighting and power plants.

Ford Motor Co. established records for tractor production in its plants from June to October. The combined output by months was: June, 9,149; July, 9,776; August, 10,243; September, 10,200. More than 50,000 tractors were turned out in the six months up to Aug. 18. Ford has announced that he will start operations immediately in the Imperial mine in Barega County, Michigan, which was included in his recent purchase of ore and timber lands.

Lexington Motor Co. has purchased for \$260,000 a building under erection on Fourteenth Street, Long Island City, and will use it for a service and repair plant.

OAK TIRE ADDS TO CAPITAL

TORONTO, ONT., Nov. 29—Reorganization of the Oak Tire & Rubber Co., Ltd., is taking place, and in connection with the increase of the authorized capitalization from \$400,000 to \$3,000,000 a stock dividend of 100 per cent is being

paid to shareholders in the original concern. A quarter of a million dollars of 8 per cent preferred stock will be sold to provide funds for extensions to the plant at Oakville, Ont., and for machinery and working capital. The company was originally organized in 1916. The capacity at present is 300 tires a day, but when the extensions to be provided out of the present financing are completed the capacity will be 500 tires a day.

The company's balance sheet of June 30 showed current assets of \$320,654 and current liabilities of \$187,942. Total assets were \$666,964 and the balance \$106,823. Net earnings for six months were \$66,976.

Durant to Continue
as G. M. C. Director

(Continued from page 1146)

large block of General Motors stock. He has been the commanding figure in building up General Motors to its present gigantic proportions and ranks among the leaders in the industrial and financial worlds. It is universally conceded that his career as a man of affairs is by no means over and that sooner or later, unless he returns to General Motors, he will be found at the helm of some other great enterprise.

This is the second time in the history of General Motors that Durant has lost control of the company. General Motors is essentially a Durant creation, representing his foresight in estimating the phenomenal growth of the automobile industry. So pronounced was the advancement of the company that in 1910 there was urgent need for cash to meet the expansion program and a loan was negotiated in Wall Street through J. & W. Seligman. A five-year voting trust was formed and Durant suddenly found himself an outside figure in relation to the company so far as active management was concerned.

He bided his time and ultimately won back control after the issue of notes had been paid off out of earnings, and the voting trust dissolved. A spectacular stock market operation was involved whereby Durant bought up control. He had organized the Chevrolet Motor Co. and proposed that General Motors buy it. This General Motors refused to do, and Durant proposed then that Chevrolet should buy General Motors. He succeeded in this by offering five shares of the smaller company's stock for each share of the older company, and control passed to him.

CHANDLER EARNINGS \$8,300,000

CLEVELAND, Nov. 27—Earnings of the Chandler Motor Car Co. will be in the neighborhood of \$8,300,000 for the year ending Dec. 31 next. This makes an approximate return of \$29 per share before taxes are deducted, or around \$23 per share after taxes are deducted. Production has been reduced to 800 cars a month from the peak figure of 3000 attained in mid-summer. This quantity compares favorably with other years with the exception of 1919. The 1920 production is expected to exceed 24,000.

Bank Credits

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

NEW YORK, Dec. 2—While the easing in money rates has not continued long enough to draw positive conclusions, it is regarded by some as an indication of the relaxing of the credit strain. The ruling rate for call money last week was 6 per cent with a range of 5 per cent to 7 per cent, as compared with 6 per cent to 9 per cent the week before.

Time money was offered in abundance at lower rates than the week before. The rate on 60 and 90-day paper was 7 per cent to 7½ per cent as against 7½ to 8 per cent the previous week, while the rate on 4, 5 and 6-months paper dropped to 6 per cent as against 7½ per cent the week before. The rates quoted varied with the quality of the collateral and the credit of the borrower.

In part, this easing of money has apparently been effected by the return of money to the financial centers following the passing of the peak of the crop moving season, and by the large scale liquidation which has been occurring on the stock market.

There were no particularly outstanding features in the week-end bank statements. Loans of the New York associated banks declined last week \$13,355,000, while total net deposits increased slightly. Reserves declined from an excess of \$12,470,380 over legal requirements the previous week, leaving a deficit of \$4,085,500, caused in the main by a reduction of \$15,692,000 in member bank reserve deposits.

The New York Federal Reserve Bank showed improvement in its reserve position. Total cash reserves increased \$8,728,127. Bills on hand declined \$11,473,747, total earning assets \$16,897,102, and net deposits \$15,571,410.

The Federal Reserve Banks as a whole improved their reserve position also, chiefly because of an increase in cash reserves of \$15,052,000 and a decline in net deposits of \$9,099,000. Bills on hand increased \$34,352,000, in spite of a decline of \$27,524,000 in bills bought on the open market. Federal Reserve notes in circulation increased \$18,194,000. The ratio of gold reserves to Federal Reserve notes in circulation, after setting aside 35 per cent against net deposits, was 48.9 per cent last week as against 48.6 per cent the week before.

MURRAY BUYS ST. LOUIS PLANT

ST. LOUIS, Nov. 29—The J. W. Murray Mfg. Co. of Detroit has purchased the plant of the St. Louis Paper Can & Tube Co. in the northwest industrial district, of which the Buick and Chevrolet plants form a part, for use as a motor car crown fender and gasoline tank factory. Possession will be given March 1. The consideration was not stated but was approximately \$250,000.

FINANCIAL NOTES

Rowe Motor Mfg. Co., Lancaster, Pa., has increased its capital stock from \$500,000 to \$2,000,000.

Automobile Finance Corp., Richmond, Va., has been granted a charter authorizing a maximum capitalization of \$300,000.

Ohio State Tire Co., Port Clinton, Ohio, has issued notes of \$59,971.81 to cover a judgment secured against it by A. W. Bruess, president of the company, and five stockholders.

A. B. Hudson, K. C., will head an automobile finance corporation to be formed at Winnipeg with a capital of \$3,000,000, of which \$1,500,000 is 8 per cent preferred stock and the balance common.

National Motor Car & Vehicle Corp. stockholders will meet Dec. 8 to authorize an increase in stock from 80,000 shares to 150,000, of which 140,000 will be common stock without par value, and 10,000 preferred with a par value of \$100. The preferred will be 8 per cent cumulative.

Frick-Gelser Co. has been incorporated in Pennsylvania with \$3,000,000 capital to take over the plant of the Emerson Brantingham Implement Co., at Waynesboro, Pa., and the light machinery manufactured by the Frick company. The Emerson company reserves the Minneapolis tractor, the manufacture of which will be transferred to one of its Western plants.

Pontiac Body Co. directors have filed application to have the company dissolved. General Motors bought the company in March, 1919, and there is still to be distributed to stockholders \$7,778 due on the purchase and \$20,000 in the bank.

Commercial Credit Co., Baltimore, will increase its capital stock to 240,000 shares, a 100 per cent increase. This will be divided equally between common, preferred and class B preferred (all \$25 par). A 20 per cent stock dividend will be paid Dec. 31. The usual 12 per cent a year cash dividend will be continued.

Norwalk Tire & Rubber Co. reports gross sales for the eight months ended Aug. 31 as \$3,048,800, and net profits after all charges but before Federal taxes of \$703,807, or at the rate of nearly ten times dividend requirements.

Victor Rubber Co. reports earnings for the nine months ended Sept. 30 as \$105,624, before Federal taxes but after reduction for all other reserves. Current assets are \$1,253,990, compared with \$697,319 current liabilities.

Bergougnan Rubber Corp., Trenton, has paid its usual quarterly dividend of 1½ per cent on preferred stock for the quarter ending Oct. 31.

Dearborn Garage Equipment Co., Kalamazoo, Mich., has increased its capital stock from \$100,000 to \$200,000.

Gerline Brass Foundry Co., Kalamazoo, Mich., proposes to increase the capital stock from \$20,000 to \$100,000.

Curran-Detroit Radiator Co. will pay the first regular quarterly dividend of 2 per cent cash Dec. 20.

Union Twist Drill Co. has declared a quarterly dividend of 62½ cents a share on common, payable Jan. 3.

Diamond Holfast Rubber Co., will construct a new factory building that will serve to increase the plant's capacity.

Gray & Davis showed a profit in August of \$8,600 and in September of \$3,400. Indications are that the October showing will be better than that for September. These profits are based on a very conservative inventorying basis and after depreciation charges at the rate of \$200,000 a year. The Cambridge plant is operating at about 35% capacity and the Amesbury lamp plant is being overhauled.

Goodyear Financing
May Reach \$35,000,000

AKRON, Dec. 1.—Regarding the Goodyear Tire & Rubber Co.'s program of permanent financing now being negotiated, an official statement was issued to-day by Vice-President G. M. Stadlemen. The statement follows:

"Some time ago the Goodyear Tire & Rubber Co. made an arrangement with a group of banking interests for a temporary loan of \$25,000,000 to help carry its inventory, which, while high based on present business, would have been normal under usual conditions. The loan will be payable Feb. 15, 1921. It was made to enable the company and the bankers to work out permanent financing plans in the interim.

"Our annual meeting is scheduled for Dec. 6, but will be adjourned and a special meeting held shortly thereafter, at which time the permanent financing plan will have been completed, and will then be announced."

There are reports that the permanent financing may involve \$35,000,000.

Reo Motors Assets
Increase \$6,000,000

DETROIT, Nov. 30.—Total assets of \$22,175,689, an increase of about \$6,000,000 over last year, is shown on the Reo Motor Car Co.'s balance sheet as of August 31. The surplus of \$9,747,399 is an increase of about \$3,400,000 over 1919 and is equivalent to \$18 a share on approximately \$7,000,000 outstanding capital stock. Current assets are \$15,263,727, an approximate increase of \$4,000,000, and liabilities \$5,491,120, an increase of approximately \$2,300,000. Net working capital is \$9,772,598, which is an increase of approximately \$1,000,000. Capital assets are \$5,595,704 after charging \$1,048,819 for depreciation. Investments are \$1,250,819 compared with \$80,797 a year ago due to increased valuation of branches. The report shows \$1,000,000 in notes payable in the 1919 balance sheet eliminated. Reserves include \$2,740,303 for Federal and local taxes.

FULLER & SONS IN OPERATION

KALAMAZOO, MICH., Nov. 30.—Fuller & Sons Mfg. Co., which was reported in AUTOMOTIVE INDUSTRIES as being shut down, was inactive for only a week, and that, states W. P. Fuller, because of a lack of shipping specifications. Since that time the plant has been in continuous operation with a reduced force and expects to continue.

MEN OF THE INDUSTRY

R. E. Chamberlain, for the last four years truck sales manager for Packard Motor Car Co., has been promoted to assistant general sales manager. Chamberlain formerly was branch manager at Philadelphia for Garford Motor Truck Co.

Col. Sidney D. Waldon, formerly with the Packard and Cadillac organizations and prominent in aviation engineering circles, has been elected president of the Detroit Automobile Club to succeed Edward N. Hines.

W. R. Wiley has been appointed production manager of the Apex Motor Corp. to succeed C. L. Graham, who has resigned to take charge of service on the Ace car on the Pacific Coast. Wiley for the past three years has been chief engineer of the King Motor Car Co.

W. J. Murray has been appointed general sales manager of the Troy Wagon Works Co., Troy, Ohio. Formerly he was with Splittdorf and the Arc Cutting & Welding Co.

George T. Bryant has been appointed director of sales of Robert H. Hassler, Inc., Indianapolis. For the past several months Bryant has been in charge of export sales for the company, during which he increased this business largely.

Charles S. Clark has resigned as sales, export and advertising manager of the H. J. Koehler Motors Corp., Bloomfield, N. J., after three years of service. His plans for the future are not announced. Clark has been connected with the motor truck and automobile industry for sixteen years, having served as an executive in each of the positions he held with the Koehler company.

W. F. Fike and George C. Mecklin, both well known for their success in tire building and calendaring, have joined the Syra-Cord forces at Syracuse. Fike was with the Goodrich and Miller rubber companies. Mecklin for several years has been head of the calendaring department of the Miller Rubber Co.

Reorganization Ready
on Maxwell-Chalmers

NEW YORK, Dec. 1.—At a meeting yesterday of the Maxwell-Chalmers reorganization committee, headed by Walter P. Chrysler, a committee of four was appointed to declare the plan of reorganization effective whenever the time seems opportune. There is no longer any doubt that the plan will become effective but the committee will wait for the psychological moment before putting it into effect. The committee is headed by E. R. Tinker, a vice-president of the Chase National bank who drafted Chrysler and J. R. Harbeck to take charge of the muddled affairs of the two companies. Time to file application for purchase of more than the minimum amount of stock in the new company which will be formed has been extended until Jan. 3. It is expected the allotment will be made Jan. 6.

KARDELL CREDITORS MEET

ST. LOUIS, Dec. 2.—The Kardell Tractor & Truck Co. has called a meeting of its creditors for to-day. The company recently announced that it would increase its capital from \$1,000,000 to \$3,000,000.

Calendar

SHOWS

- Dec. 7-10—Cincinnati, Automobile Show in connection with Ohio Automotive Trade Ass'n Convention, auspices of Cincinnati Automotive Trade Ass'n, Music Hall, J. J. Behle, Mgr.
- Dec. 10-12—New York, Motor Boat Show, Grand Central Palace.
- Dec. 11-20—Los Angeles, Annual Automobile Show, Los Angeles Motor Car Dealers' Ass'n.
- Jan. 8-8—New York, Motor Truck Show, Motor Truck Ass'n of America, Twelfth Regiment Armory.
- Jan. 8-15—New York, National Passenger Car Show, Grand Central Palace, Auspices of N.A.C.C.
- Jan. 10-17—Portland, Ore., Annual Automobile Show, Automobile Dealers' Ass'n, Municipal Auditorium, M. O. Wilkins, Mgr.
- Jan. 15-29—Philadelphia, Annual Automobile Show, Philadelphia Automobile Trade Ass'n.
- Jan. 17-23—Milwaukee, Annual Automobile Show, Milwaukee Automotive Dealers' Ass'n.
- Jan. 22-27—San Francisco, Second Annual Pacific Coast Automotive Equipment Exposition, Auditorium.
- Jan. 22-29—Baltimore, Annual Automobile Show, Baltimore, Automobile Dealers' Ass'n, 5th Regiment Armory, J. C. O'Brien, Mgr.
- Jan. 22-29—Cleveland, Annual Passenger Car Show, Cleveland Mfr's & Dealers' Ass'n, Wignmore Coliseum.
- Jan. 22-29—Montreal, Annual Automobile Show, Montreal Automobile Trade Ass'n, Motordrome Bldg.
- Jan. 29-Feb. 4—Chicago, National Passenger Car Show, Coliseum, Auspices of N.A.C.C.
- Feb. 5-12—Minneapolis, Annual Automobile Show, Minneapolis Automobile Trade Ass'n.
- Feb. 6-12—Columbus, National Tractor Show, Columbus Tractor & Implement Club, Ohio State Fair Grounds.
- Feb. 12-19—Hartford, Conn., Annual Automobile Show, Hartford Automobile Dealers Ass'n, Armory, Arthur Fifoot, Mgr.
- Feb. 12-19—Kansas City, Annual Automobile Show, Kansas City Motor Car Dealers' Ass'n.
- Feb. 14-19—St. Louis, Annual Automobile Show, St. Louis Automobile Mfr's & Dealers' Ass'n, Robt. E. Lee, Mgr.
- Feb. 14-19—Winnipeg, Western Canada Automotive Equipment Show.
- Feb. 18-28—San Bernardino, Cal., National Orange Show, Fred M. Renfro, Mgr.
- Feb. 19-26—San Francisco, Fifth Annual Pacific Automobile Show, Exposition Auditorium,* George Mahlgreen, Mgr.

ium,* George Mahlgreen, Mgr.

- Feb. 21-26—Louisville, Annual Automobile Show, Louisville Automobile Dealers Ass'n, First Regiment Armory, C. L. Alderson, sec'y.
- Mar. 2-10—Des Moines, Annual Automobile Show, Coliseum, C. G. Van Vleet, Mgr.
- Mar. 5-12—Brooklyn, Annual Automobile Show, Brooklyn Motor Vehicle Dealers' Ass'n, 23d Regiment Armory, George C. Lewis, chairman.
- Mar. 7-12—Syracuse, N. Y., Annual Automobile Show, Syracuse Automobile Dealers Ass'n, Armory, Howard H. Smith, Mgr.
- Mar. 7-12—Indianapolis, Annual Automobile Show, Indianapolis Automotive Trade Ass'n, Automobile Bldg., State Fair Grounds, John Orman, Mgr.
- Mar. 12-19—Boston, Annual Automobile Show, Mechanics Bldg. and South Armory.
- Mar. 14-19—Omaha, Annual Automobile Show, Omaha Automobile Trade Ass'n, Inc., Omaha Auditorium, C. G. Powell, Mgr.
- April 4-9—Seattle, Annual Automobile Show, Seattle Motor Car Dealers' Ass'n, Arena Hippodrome.
- April—Chattanooga, Tenn., Spring Automobile Show, Chattanooga Automotive Trade Ass'n, Sunday Tabernacle, C. A. Noone, sec'y.

FOREIGN SHOWS

- Jan. 7—Sydney, Australian Motor Show.
- Jan. 22-29—Colombo, Ceylon Motor Show.
- Feb. 7—Delhi, India, Delhi Motor Show.
- Mar. 23-28—Witwatersrand Agricultural Show including machinery and motors sections.

CONVENTIONS

- Dec. 7-10—New York, Annual meeting American Society of Mechanical Engineers, Engineering Societies Building.
- Dec. 8-9—Cincinnati, Annual Convention, Ohio Automobile Jobbers' Association.
- Dec. 19—Washington, Convention of American Association of State Highway Officials.
- Dec. 28-30—Chicago, Annual Meeting American Society of Agricultural Engineers.
- Jan. 7—New York, Advertising Managers Council, Motor & Accessory Manufacturers' Ass'n.
- Jan. 11-13—S. A. E. Annual Meeting, New York City.
- Feb. 2-4—Chicago, First Annual Meeting, Automotive Electric Service Assn. Hotel La Salle.
- May 4-7—Cleveland, National Foreign Trade Council.
- Oct. 12-14, 1921—Chicago, Twenty-Eighth Annual Convention National Implement & Vehicle Ass'n.

Exports for October

Increase \$150,000,000

WASHINGTON, Nov. 26—Exports from the United States for the month of October were almost \$150,000,000 in excess of those of September. This fact, announced to-day by the Department of Commerce, was not generally expected. The respective figures for the two months were officially given as \$752,000,000 and \$605,000,000. Imports were slightly lower during the month, the comparative figures showing \$362,000,000 for October and \$363,600,000 for September.

The report considers all export business and the automotive division of it was not given. The figures for it will not be available for some weeks but on other showings it is considered probable that the automotive exports will be as large if not larger than those of September.

The surprising increase was due probably to the decreased prices which came into effect with the fall months. Grain and cotton were both taken in larger volume because of this decrease and it is believed that many lines of manufactured goods probably were taken similarly.

TO DECIDE IMMEL FUTURE

COLUMBUS, Nov. 29—The future of the Immel Co., large body manufacturers of Columbus, which has been in the hands of R. H. Schriver, as receiver, for the past two months, will soon be determined by a meeting to be called by the

receiver. The American Appraisal Co. has completed an appraisal of the assets and an auditing concern will soon complete the auditing of the accounts. When this work is finished a meeting of the creditors and stockholders will be called to discuss its future. F. A. Miller is now in charge of operations and the output has been doubled under the receivership, with much less overhead.

Motor Products Shows

Assets of \$5,616,394

NEW YORK, Nov. 30—The balance sheet of the Motor Products Corp. of Detroit, as of Oct. 31, shows net quick assets of \$5,616,394. Its inventories are valued at \$2,131,646, notes receivable and trade acceptances total \$285,003, accounts receivable \$1,288,906, and cash \$2,796,744. Current liabilities include accounts payable of \$328,272, salaries and payroll, \$91,286, and a total of \$483,912 for accrued interest, taxes and reserves. Allowance also is made for bad debts.

RAY BATTERY IN NEW PLANT

YPSILANTI, MICH., Nov. 29—Ray Battery Co., formerly of Detroit, is in production in its new factory and with the completion of the work of installing machinery a schedule of thirty a day by the first of the year has been laid out. The factory is equipped with all the speed-up machinery necessary to maintain production schedules, according to President R. R. Fisher.

Ontario to Increase

Motor Vehicle Fees

TORONTO, ONT., Nov. 29—Increased license fees will be charged owners of motor cars by the Department of Public Works next year, when Hon. F. C. Biggs, Minister of Public Works, hopes to increase the revenue of the province from this source by \$750,000. The revenue this year amounted to more than \$2,000,000. "As the automobiles use the roads the most," Hon. Mr. Biggs said, "we feel that they should pay their share of the cost of the highways."

The number of cylinders in automobile engines is taken into account in the new licenses, which was never done before. The fee for passenger cars of 25 hp. or less will be from \$13 to \$20. The present fee is \$10. For passenger cars of 25 to 35 hp. the fee will range from \$15 to \$35. The present fee is \$15. Cars of 50 hp. or over will pay from \$30 to \$40. The present fee is \$30. The smallest motor truck, which now pays \$10, will be \$13. Trailers, which at present pay nothing, will be charged from \$2 to \$5.

CLIMAX ENGINE FOR STROUD

CLINTON, IOWA, Nov. 27—The Climax, Model KU 5x6½-in. tractor engine has been adopted by the Stroud Motor Mfg. Assn., San Antonio, Tex., as standard equipment in its All-in-One tractor. Plans are being made for a production of from 1000 to 2000 tractors in 1921.

AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

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No. 24

There Is an Automotive Future; Speak Well of It

The automotive industry, generally speaking, is a well-designed, well-equipped machine. It has just been in the garage for an overhauling. Some bugs have been eliminated and we are ready to start on a long-distance race. Now, rooters, all ready!

By Clyde Jennings

DESPITE all you may hear to the contrary, the automotive industry has a future. It will be a bigger and better future and will develop more quickly if we all speak well of it.

Victor Hugo said regarding his good old Bishop, "His past life would have made no difference, but that there were so many tongues to talk and so few heads to think."

Such a situation often arises, in business as well as socially. There never was a better time than the present for the automotive industry to stop, look and listen and define its program for the future, then talk about that program and let the past be buried. Of course there are a lot of good deeds that deserve to live, and they will live without our talking about them for the next few weeks. There are things much more important to talk about.

The other day a student of the automotive industry paraphrased J. P. Morgan's famous remark, "The man who is a pessimist on the future of the United States goes broke," in this way:

"The man who is a pessimist on the future of the automotive industry will go broke if he deals with it financially."

We think you get the idea.

The head of one of the largest manufacturing plants in our industry remarked a few days ago:

"We are looking only to the future. A few weeks ago we looked the situation fairly in the face and decided what was going to happen to affect us adversely. All of the things that we looked forward to are happening. We have seen nothing discouraging in itself since then. Some of the favorable things we expected to happen have not happened as yet. But they are coming, only more slowly than we hoped. We expected to see some revivals start. They are starting, but not with the force that we expected. We underestimated the time necessary for the house-cleaning in some other industries, but these are being ironed out and very soon we shall all be able to start uphill together."

Now let us look over the field for a moment.

Recent developments have confirmed the belief previously held that the financial interests of the country are entirely and well sold on the possibilities of the automotive industry. These interests are working with all of their power to conserve the useful productive capacity of the country. We already have

evidence that no efficient, useful, productive plant will be allowed to pass into ruins. In our industry failures have been few. With the dawning of the revival appearing, there are going to be fewer failures. New capital is coming into the industry and new men of the caliber required are coming with this capital. Next year will see the industry better financed than ever before.

Parts makers have recently told us that they are receiving good contracts for next year. Price difficulties that existed between the car maker and the parts maker are being ironed out and the principal factories (if we may quote an important equipment maker) are placing definite orders. The scare of cancellations is passing. Most parties to these cancellations realize that it was bad business practice, a development of the war time period when a cancellation made no difference to any one, because anything could be sold for something and everybody was too busy making money to count up the losses.

This cancellation business has been a serious lesson, however, but let's bury it with the rest of the bad business and resolve never to do it again.

During the present period the export trade has been appreciated as never before. It has been a life saver for some factories and is supplying a reason for opening some of the factories that have been down. We hope this lesson will never be forgotten and that next June, if sales crowd production, the manufacturer will not forget what he learned this fall.

But we started to talk about the future.

The show season will come just after Christmas. First, the two manufacturers' shows and then the host of dealer shows. All of these are going to be of the very utmost importance. It is of record that in the two national shows that the requests for dealer tickets are much greater than ever before. This means that the manufacturers are making a greater effort than ever before to meet the sales situation. They are going to bring in their dealers and talk with them. That is a hopeful sign, if they will talk of the future and not of the past.

We might as well be frank. If either the manufacturers or the dealers start talking of the past, the mud-slinging will not stop soon enough for the future program to start. Neither selling organization has been without fault and the story is a very long one.

But why not get down to the future right when the meeting opens and be sure that all present understand what "salesmanship" means, and then tell how they are going to get busy.

As a matter of fact, both dealers' and manufacturers' sales departments are, by and large, good fellows and they are earnest in their work. Both have the same object in view and there is no reason why they should not work together. They **MUST** work together, if they will succeed.

The manufacturers must realize that the men in the display spaces at the shows must not be selected because they happen to have evening suits and look well in them. They must be selected because they can take advantage

of every opportunity to talk intelligently and directly on all points regarding the car exhibited, obtain the name of the prospect and know what to do with it.

The coming show season is not one in which any person interested in the automotive business can afford to let any prospect slip. He will need them all.

Now we hope no manufacturer is fooling himself with the idea that he is going to book enough orders at the show to run his factory all of 1921 at the rate he planned to run in 1920. But we hope that every manufacturer will go to the show with his ideas set to see some material indications of relief from the present buying situation and with a just appreciation that an awakening cannot and will not come all at once.

We are passing through a period of careful buying. This feeling will not pass entirely for a long time. It will be relieved. The most potent force in relieving this situation will be for the commodities that go to make up the general cost of living to reach what to the average mind is a fair level.

Until the average mind is more or less settled on this cost of living item, the chauffeur of the average mind is going to be a very hard man to sell to. While he is in a fighting mood with the grocer, baker, clothing merchant and with all of those lines of business with which he comes into daily contact, he is not going to spend money freely elsewhere.

The recent sales slump was more of a psychological problem than a financial one. Its cure must take this into consideration. Practically every one who has a purse to-day is watching it very closely. He believes that whoever comes near him has designs on the purse and he believes that every one except himself is profiting by the present circumstances. He is defiant to any effort to persuade him to

buy anything. It is a fact that some very wonderful bargains in food and clothing are going begging to-day.

When the manufacturer and the dealer meet it will not be a case of either saying to the other:

"It's your job."

They will have to say:

"It's our job, and so big a one that we all must work at it."

Let us suppose that these things work out this way. The exhibits are properly handled at the shows, some sales are made and the proper use made of the information gathered, then what?

Well, spring is coming, and just as surely as the young man's mind turns to love, so does the mind of the average individual turn to better and more cheerful things. The season for automobiles will be before him, the profiteer story in the newspapers will have been succeeded by the story of the attempted economies of the G. O. P. Administration in Washington. The entire environs of the individual will be changed.

So will be the environs of the sales departments. Both the prospect and the salesman will have learned much while the snow was with us. Everybody will be refreshed. These conditions should make for business.

THIS article makes no reference to prices of cars. We already have expressed an emphatic opinion on that subject, and it still stands with us. It is this:

Make your price as low as you can in justice to yourself and your labor. Do not be afraid to write off some losses in high priced buying of materials. Remember that financiers believe that a readjustment is due in prices. They are more willing to help those who look at the situation fairly than those who look at it selfishly. Remember also that labor is cheaper, if not in wages, in production.

Please remember, also, that you are a part of the industry and that what is best for the industry is best for you. Your price is your own business and if you make a mistake, you alone must take the blame.

Of course, the lessons of adversity never last long, especially to youth. It is not literally true that the burnt child shuns the fire, but we hope that this big, youthful industry of ours will remember the lesson long enough not to believe that a few swallows make a summer and that because they sell a few cars next spring the pace will grow to that of early 1920. There is a season of hard work before all of us.

We are optimistic, to be sure. We are enthusiastic, to be sure. We hope all of you are.

But don't let optimism and enthusiasm run away with you.

The automotive industry is not coming back, because it has never been away. It only slowed down a bit. It has been here all of the time.

It is already speeding up. But we are not expecting that anyone will jump into high at once. It is upgrade and speed must be gathered slowly. The truck, as is natural, got going a bit slower than the passenger car, and as it never quite gains the speed of the passenger car, it is going to gather speed more slowly. But the day is coming when its weight and accumulated speed will put it out in front.

Remember that the truck is not a speed marvel. It is not like the passenger car in sales. Impulse has little to do with buying a truck. The automobile should sell on the upward surge of the improved conditions, but the truck will have to wait until industry is adjusted to the improved conditions before it gets to going well.

And just here let us put in a word about truck selling. The entire system, from the factory down, is due for a readjustment and it must have it. Just as surely as business gains impulse, the truck business will follow if the truck salesmen are competent to present the truck to business men who need transportation.

The day of long credits and foolish truck sales are past.

We said we were not going to talk of the past. But we want to refer to a bit of the past that is going to be a brilliant part of the future.

You all know that there are several truck and passenger car factories that are going forward at a rapid rate and their production has been cut but a very little bit.

It happens that the writer knows something of the sales history of these companies. He believes that they are of the highest type that exist in this or any other industry.

1. They are founded on equitable distribution.
2. A sales territory that insures the dealer a living with the amount of merchandise that can be given to him.
3. On prompt service and shipment of parts.
4. On fair dealing to every man.
5. A proper system of follow ups.
6. On useful helps from the home office for every man who is connected with the sales department.

All of these firms, so far as we have been able to learn, have taken on their foreign business on exactly these terms. No chance sales and shipments were ever completed.

The idea behind the sales is that every car or truck sold shall stay sold, if it is in the power of the dealer or the factory to keep it sold.

We hope you let the last statement sink in. It does not say that all factories that have been down in part or total had defective sales systems, but it does say that all factories that did not show any great degree of slowing up had efficient sales departments.

Think it over. Perhaps you can find some place in the sales or service departments where there was a cotter pin missing, some lost motion or a worn out gear.

Just one word more. It has been asked what could be done with the new capacity for production.

One answer is to make parts for the vehicles already sold. There is a lot of money in parts. It is quite as profitable to keep some cars running as it is to sell a new one to replace it. When business gets going and cars begin running, there is going to be a big demand for service. Be sure that you are ready to meet these demands.

Did it ever occur to you that the talking machine folks are less interested in the sale of the machine than in the sale of records that it leads to!

Tractor Production in the United States

IN an investigation made by the Bureau of Public Roads, United States Department of Agriculture, of the production of tractors in the United States during 1919, reports from 80 manufacturers show that they manufactured a total of 164,590 tractors during the year. The number actually manufactured during the year was only a little over one-half of the total production estimated in reports made to the Office of Farm Equipment Control, United States Department of Agriculture, in January and February, 1919. Labor troubles and shortage of material, together with the fact that some of the companies discontinued the building of tractors, accounts in part for the decrease in production below the estimate.

The reports also gave the number sold in the United States and for export, and the number on hand, in transit, in branch houses, and in the hands of dealers unsold on December 31, 1919. Five of these manufacturers built only tractors of six belt horsepower and less. In all, reports were received from 156 companies but only 80 had manufactured machines during the year. It is believed that the total number of machines manufactured by these 80 firms represents at least 95 per cent of the total tractor production in the country during the

year. The number of tractors of different sizes built by these companies during the year 1919 is as follows:

Makers' Rating Belt Horsepower	Number of Tractors Built
6 and less.....	3,760
9, 10 and 12.....	1,991
16 and 18.....	22,012
20 and 22.....	94,653
24, 25 and 26.....	15,546
27, 28, 30 and 32.....	17,597
35 and 36.....	2,453
40, 45 and 50.....	1,954
60 and over.....	1,624
Not given.....	3,000
	164,590

The following is a summary of the reports received from the manufacturers for 1916 to 1919 inclusive:

	1916	1917	1918	1919
Number manufactured	29,670	62,742	132,697	164,590
Number sold in the U. S..	27,819	49,504	96,470	136,162
Number sold for export....	....	14,854	36,351	19,693
Number on hand Dec. 31..	....	15,525	15,401	27,740

British Truck Show Reveals New Tendencies in Design

At the first exhibition since 1913 decided changes in practice are noted. A majority of the trucks use the overhead worm drive and pressed steel frames are employed in three-fourths of the models. T-head engine being replaced by L-head type. Trade dull and slight interest shown.

By M. W. Bourdon

THE falling off in the volume of sales of commercial vehicles, which commenced two or three months ago in Great Britain, may have been checked to some extent by the exhibition at Olympia (London), Oct. 14 to 23, but the show has not brought any rush of orders to makers of vehicles of load capacities from 2 (long) tons upward. It was sparsely attended by prospective buyers in general and those of certain types of vehicles in particular, though it was hardly expected that the condition of affairs brought about by the sale of large numbers of surplus Government trucks would be varied appreciably by the exhibition.

These surplus Government trucks, mainly of 3 to 4½ tons load capacity, are being taken in hand by responsible firms—in some cases by their original makers—and after renovation, amounting almost to rebuilding, are being sold, or perhaps one should say offered for sale, at prices approximately half those of new vehicles of similar type. No wonder, then, that orders for trucks of this type have been comparatively few at Olympia. But quite a number of makers of 1 to 1½ ton trucks tell a different tale and report a very distinct improvement in respect of orders and inquiries.

The "heavies," represented by types carrying from 5 to 10 ton loads, and ranging from gasoline engine trucks of the former capacity to steam and gasoline vehicles and trailers, are not under such a cloud as the classes immediately below them in size. But hitherto the 3 tonner has been the mainstay of the British truck industry, so that the scarcity of prospective buyers interested in new machines of this type most seriously affects the industry.

The charabancs (sightseeing type of bus) and omnibus orders have saved the situation to a certain extent, for, as a rule, a chassis similar to that of the 3 ton truck is used outside London for passenger services. Bodies for passenger services are very numerous at this show, not one maker of chassis in any way suitable failing to exhibit one or more examples. But here again, there has been a slackening in the demand relative to output.

It is of interest to note that there are only six British chassis designed for industrial purposes to carry loads under 4500 lbs. There is no one competing with the Ford truck, or supplying a modified touring car chassis for a similar purpose.

Engineering Features

From the engineering standpoint, the show has peculiar interest, if only because it brings to light, collectively, the developments which have matured since 1913, for no truck show has been held in London since that year. To cite a few of the new tendencies, there is first and foremost the popularity of the overhead worm drive, which is used on

52 per cent of the models, against 20 per cent for the double reduction, 23 per cent for chains and 5 per cent for bevel gear. The internal gear drive does not appear at Olympia on any British truck. Then there are the wider uses of pressed steel (77 per cent) in lieu of rolled steel frames; the retention of pair cast cylinders in the vast majority (77 per cent) of engines over 20 hp., but with "L" heads (84 per cent) instead of "T" heads; the increased area of wearing surfaces in such items as steering joints, spring shackles, brake shoes and drums, and brake connections.

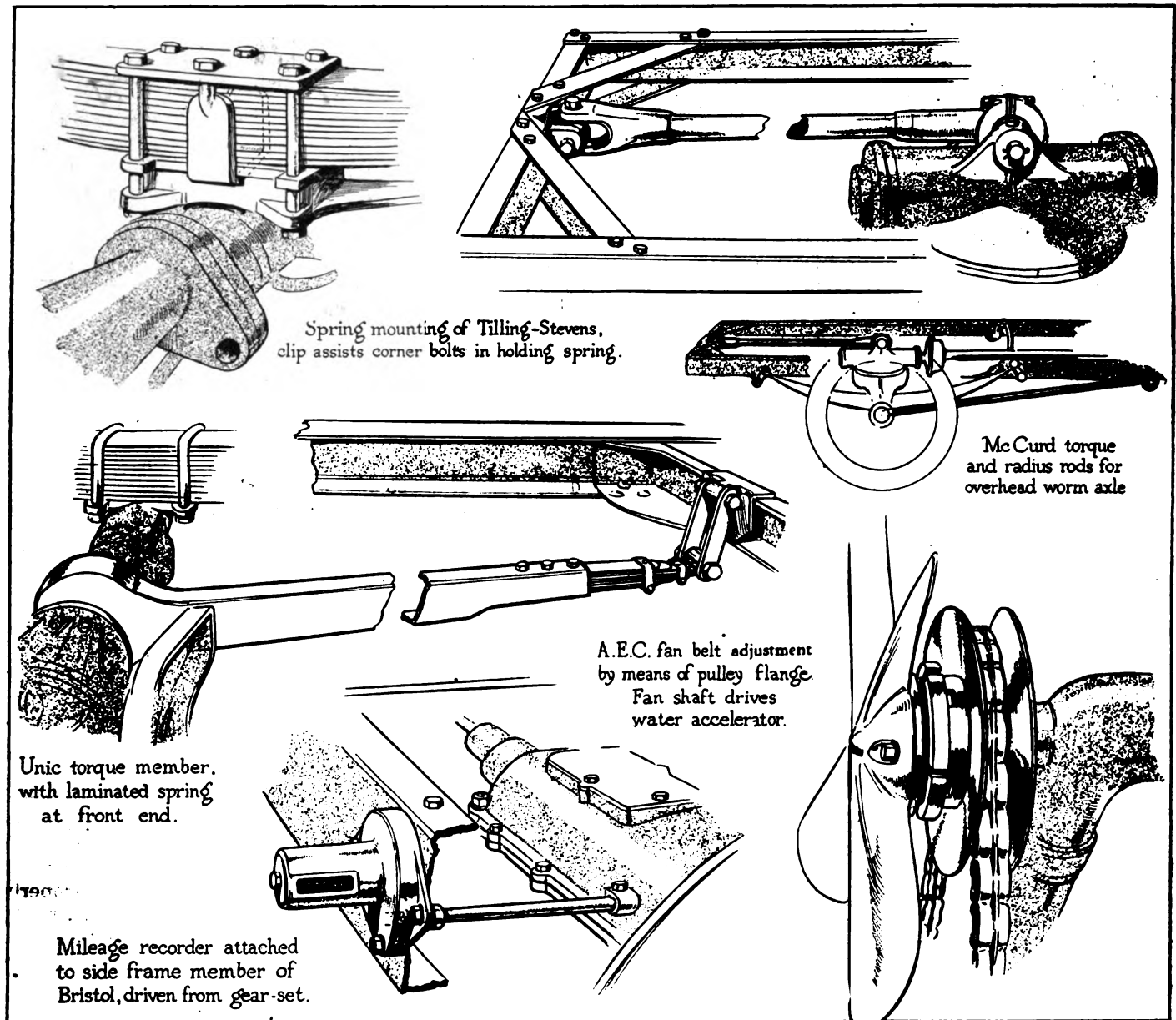
Driver's Seat Location

There are other examples of tendencies which are barely observable now, but which are very likely to prevail eventually. Of these may be mentioned the moving of the driver farther forward—alongside and higher than the engine—as in the new K type London bus chassis. This arrangement obviously lengthens the platform area without increasing the wheelbase, but, to be carried out properly and to its logical conclusion, it calls for a re-designing of the engine, in the way of grouping all the units requiring attention—magneto, oil and water pumps, oil filler and level gage, etc.—on the opposite side of the cylinders or crankcase from the driver, the steering column and pedals.

The new Straker-Squire (3 to 5 ton chassis), and the new Maudslay 6 tonner are examples of this tendency, though they vary in their method of adopting it. The Straker-Squire goes only half way—there is still a short hood in front of the dash—whereas in the Maudslay the driver is right alongside the cylinders, and the latter are well below him, only the radiator projecting forward of the dashboard and "cab."

For the first time a British firm has cantilever springs on a chassis for 7500 lb. loads—the 3 to 4 ton Palladium. At present semi-elliptics are supplied with chassis for truck bodies, the cantilevers—which it should be said are in duplicate, one unit of a pair being above the other, though pivoting on the same trunnion—being reserved for charabancs and buses; but it is the intention to standardize the cantilevers in the immediate future. The makers claim that the suspension is so much improved that the effect of pneumatic tires is equalled; but in this respect it may be said that there is a general tendency to lengthen or otherwise improve the springing, and the K type bus supplementary "full load" springs of the spiral type are not now alone, Straker-Squire, Caledon and one or two others having systems on similar lines.

Before the war the rolled steel frame of channel section was very widely used in British trucks; no definite percentages are available, but it is estimated that at least 50



Details of trucks shown at Olympia

per cent of the medium capacity and heavy vehicles at the 1913 show had this type of frame, rolled steel cross members also being used. But, as mentioned above, 77 per cent now have pressed steel, the rolled type being used in 16 per cent and the flitch plate with ash filling in 7 per cent only (two Daimler models and one A.E.C., for example).

Several makers who in earlier days had rolled steel frames have continued their policy of arranging the open side of the channel outward now that they have taken to the pressed side members (Straker-Squire, for instance). The claim is that this presents manufacturing advantages, and that the user is not concerned with appearance; even if he were, the open channel is almost entirely hidden by the bodywork. The plan undoubtedly is of advantage in fitting cross members, engine bearers and brackets for the control pedals, and although the spring hangers and certain other details must then be fitted inside the channel instead of vice versa, the balance of manufacturing advantage is probably with the system, which is favored in approximately 10 per cent of British trucks.

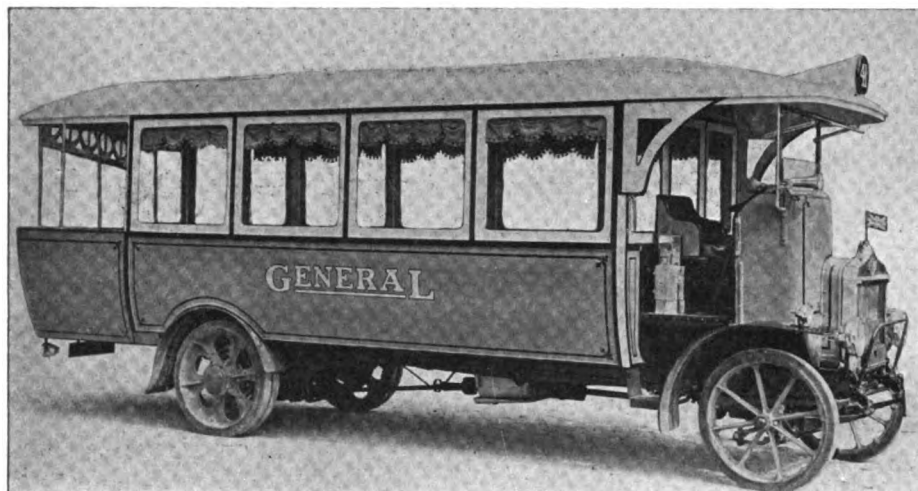
As regards dimensions, 3 to 4 tonners usually have frame sides $2\frac{1}{2}$ in. wide and 8 in. deep over the greater part of their length, but some are only 7 in. deep. The Dennis

new 2 tonner has $7 \times 2\frac{1}{2}$ in. side members, made, however, from $\frac{5}{16}$ in. plate, while truck frames up to 4 tons are usually only $\frac{1}{4}$ in. thick.

Pressed steel, tubular and cast steel cross members are all used by one make or another; the new 4500 lb. load Commer, with pressed steel side members, has a cast steel cross member under the radiator and four of pressed steel behind it. The new Halley (4500 to 5550 lb. load) on the other hand has rolled steel side members with the channel outward; two cross members at the front, carrying the engine sub-frame, are cast steel; behind them are two tubular members, and aft are two of pressed steel, the latter being braced by diagonal struts of flat section steel.

Rolled frames are, of course, of the same depth from end to end, but there is only one maker attempting to stiffen such side members between the springs by fitting a truss at each side, the unassisted channel is generally depended upon.

If an exception is made of the Palladium with cantilevers as previously mentioned, half elliptic springs are used exclusively, 75 per cent of the rear springs are mounted above the axle, the remainder are underslung. Unit shackles, either cast steel or drop forged, are favored, with bearing



A. E. C. saloon bus on K type chassis seating 36 passengers



A. E. C. combined scuttle dash and half-hood

pins of much larger diameter than before the war. In a few cases the second spring leaf is continued to support the eye of the top leaf.

There is an entire lack of uniformity in number and thickness of leaves for 3 to 4 ton trucks. For the back of this type chassis one maker uses eight leaves 4 in. wide, six of them $\frac{1}{2}$ in. thick, and another eleven leaves $3\frac{1}{2}$ in. wide, with seven of them $\frac{7}{16}$ in. thick, both sets having approximately the same centers, viz.: 54 in.

Complaint is rife concerning the quality of springs. Batches vary almost incredibly when the care taken in making up specifications of steel is considered. One designer was only stopped at the last moment from writing for samples to U. S. A., his directors objecting on patriotic grounds.

Engines, Cylinders and Valves

Only the 3 to $3\frac{1}{2}$ ton Halley has 6 cylinders (cast in threes). All the others have four cylinders, and among these 77 per cent have pair-cast cylinders and 23 per cent block cast, none of the latter being in chassis of over 2 tons capacity. The tendency to discard T heads and adopt L heads is evidenced by the fact that 84 per cent have the latter, though Dennis, one of the oldest and best known makers, still favors the T head, and retains it in his new 2 tonner, as well as throughout the range of sizes. Thornycroft is the only other maker of note with the valves on both sides, but one model has overhead inlet and side exhaust.

Overhead valves, apart from the case just cited, are used by only three makers, one producing a small parcel carrier. Maudslay still continues the overhead camshaft, which with its bearing housings can be pivoted over to one side, clear of the valves, a universal joint being located near the top of the vertical drive shaft. This arrangement is used on all models, including the new 6 tonner, with pair-cast cylinders. The Scammell tractor (with two-wheeled trailer) has an overhead valve engine with push-rods, the only example of this arrangement. Daimler has the Knight valves, of course, while the Argyll type (Burt) single sleeve has been taken up for a new model by Caledon, an old established firm.

Detachable heads appear in only 20 per cent of engines, pair-cast and block, and where they are used the cylinders are invariably separate from the aluminum crankcase. The latter material, by the way, is normal for crankcases and for 50 per cent of gearsets.

The hollow shaft system of lubrication has made a lot of headway since 1913, when either the trough or the drip

and splash appeared in the vast majority of engines. Hollow shaft systems are used in 57 per cent of models, the remainder having modifications of the trough arrangement.

More attention is being paid to filtration of the oil, especially in making very accessible a large fine mesh gauze strainer. This is usually found in a chamber cast on the side of the crankcase, well above the oil level, and can be removed, cleaned and refitted without loss of lubricant in a minute or so. While the desirability of this has appealed to makers using hollow shaft lubrication, the trough system adherents in many cases still have the only filter in the sump, generally with the submerged oil pump in the center of a cylinder of gauze, the latter attached to and removable with a small under-plate.

The gear type oil-pump is by far the most widely used. Daimler uses the multiple plunger type with trough lubrication for the big ends, while the Albion has it for a variation of the hollow shaft arrangement.

Plunger circulation indicators for trough systems and gauges for the hollow shaft, both connected as usual to bypass pipes, are the rule; but in Commer trucks, which have the trough system, the whole of the pump delivery is taken to a sight feed on the dashboard, the oil passing in a stream within view of the driver between the front and back glasses of a short cylindrical and horizontal casing, whence it flows by gravity through a $\frac{7}{8}$ in. bore pipe to the distributing ducts in the crankcase.

Cooling Systems and Radiators

Pump water circulation is used in 85 per cent of British trucks and thermo-syphon in only 12 per cent, the remainder being assisted thermo. In the latter a water accelerator placed in front of the cylinder jacket is driven by an extension of the belt driven fan shaft. The simple thermo-syphon appears on even 3, 4 and 5 ton models, and those, too, made by firms of standing and repute—Commer, for example. The new Bristol 3 to 4 tonner, made by the Bristol Tramways Company, who have had 14 years' experience as users of other makes, also has natural circulation. In some cases the pumps are belt driven, being not much different from the accelerators of assisted thermo-syphon systems. The pipes used in such cases are of smaller diameter than thermo pipes, but larger than those used for mechanically driven pumps, generally being of from $1\frac{1}{8}$ to $1\frac{3}{4}$ in. bore.

In only one case is the honeycomb radiator used, and that in a cab chassis sold also as a 10 cwt. van; the gilled-tube type with cast top and bottom tanks (nearly always

of aluminum) is almost universal, appearing on 96 per cent of the chassis. One maker, (W. & G.) uses plain copper tubes, and one (A. E. C.) has a single row of plain tubes in front of the bulk which are gilled. In 84 per cent the gilled tubes are vertical, in 16 per cent they are horizontal with top and side tanks, the latter containing baffle plates to direct the water from side to side half a dozen times in its circuit.

Radiators in approximately half the total number of chassis have some form of flexible mounting, the spring cushion and trunnion types of support being used in various forms. This is a tendency which has developed of late years, and, for obvious reasons, was called for.

Electric Equipment

The magneto is universal for ignition purposes, but with an impulse starter in less than half a dozen cases. The new Straker-Squire has this supplementary fitting with a rod to bring it into operation by hand. But it is probable that impulse starters will be used widely within the next twelve months. Buyers are beginning to ask for them, knowing that three British magneto makers have standardized automatic types, and realizing that fuel is economized when the driver knows he will not have difficulty in starting the engine after brief stops for deliveries of goods.

Variable timing for the ignition is provided in 90 per cent of British trucks, but dynamo lighting is included in the chassis price of 10 per cent only, though of the remaining 90 per cent, half have provision for a dynamo with belt drive. Only one maker—Austin—provides an engine starter as standard, though it can be and is fitted in a few cases as an extra.

Engine Control and Fuel Feed

The majority of truck engines have no governor on the pedal throttle—control. A hand lever for setting the slow running position is alone depended upon in 57 per cent. In a few cases a governor is provided as an extra; in 40 per cent of the engines it is a standard fitting. This is about the same proportion as before the war, but the governor connections are now usually enclosed completely to keep them from being tampered with by the driver. The protection thus afforded to parts which previously were tied up out of action by most drivers is very thorough. In some cases there is no inkling of their

existence, outwardly, and while this is of advantage from one point of view, it is the reverse when the governor spring adjustment is desirable, if not essential. On one make it is necessary to remove the cylinders to make this adjustment, and in others to remove the gear cover.

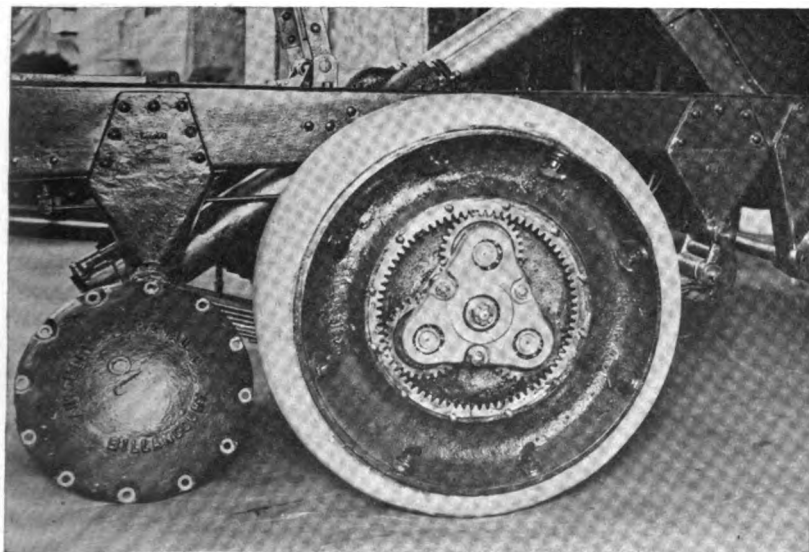
Vacuum fuel feed is not popular among British makers, and, though it appears on 7 per cent of the trucks against 93 per cent with gravity feed, the gain has been at the expense of the pressure system, which has been discarded entirely.

Engine and Gearset Mounting

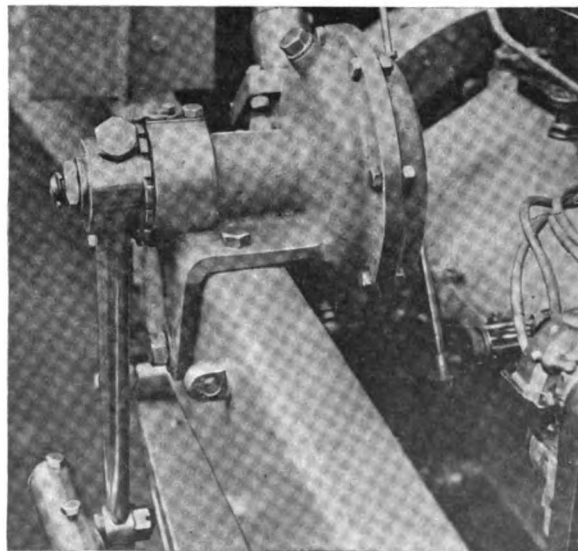
The unit power plant system is practically unknown in British trucks, Austins being the only firm which does not mount engine and gearset separately. Procedure in supporting the engine is about evenly divided between the main frame and the sub-frame method. The sub-frame sometimes carries the gearset as well, but usually the gear casing is suspended by three or four bolts from two cross members.

When no sub-frame is used, the engine almost invariably has a three-point suspension. Two practices are widely followed in this connection. The first is the fitting of a bridge forging, from which the front of the crankcase is suspended at the center over the partition between camgear casing and crank chamber proper, the rear end having either another bridge forging to which the rear face of the crankcase is bolted, or arms extending to the main frame. The second system, and the one more frequently adopted, is to support a forward extension of the crankcase in a trunnion bearing at the center of the front cross member, this extension being a bolted-on flanged and tapered cast steel unit. Four-point engine suspension in the main frame is, as inferred, practically obsolete. But sub-frame support is not so carefully considered as it deserves; it is often four-point and carries the engine by four arms—an arrangement obviously little better than no sub-frame at all and a direct four-point engine suspension.

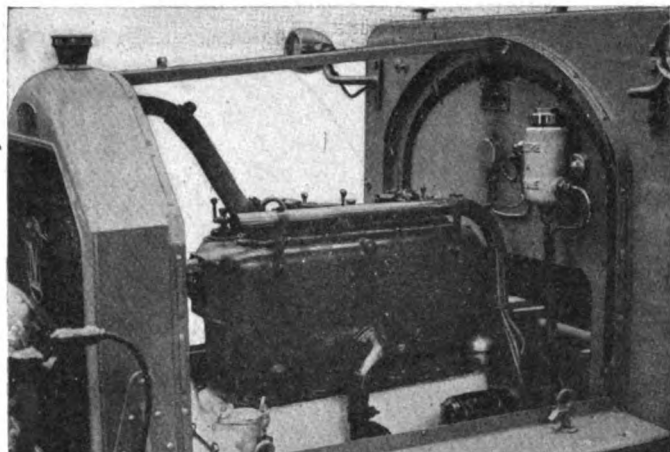
When engine and gearset are separate, the best arrangement of any, in the writer's opinion, is that of the Guy 2½ tonner, which has a three-point sub-frame for the two units, the sub-frame being of elongated horse-shoe shape in plan, of rolled steel, supported in a spherical trunnion bearing forward and depending from two universally jointed hangers at the back. As may be gathered,



Renault rear wheels of 5- and 7-tonners have bevel driven axle and epicyclic gearing in rear wheel hubs



Mounting of De Dion steering above frame member, with adjustment for side play of worm shaft



Vinot block-cast engine on 30 cwt. chassis; oil filter carried in front face of dashboard

a considerable degree of main frame distortion can occur without the sub-frame alignment being affected.

Gearsets in 70 per cent of mountings are hung below their supports, as distinct from resting upon them. They are usually bolted up from below at three points, enabling the casing to be easily lowered to the ground when the bolts have been removed.

Clutches and Coupling Shafts

The cone clutch, internal or external, is largely in the majority, being used in 79 per cent of chassis as compared with the single disk type, 19 per cent, and multi-plate, 2 per cent. While in most cases a larger diameter of cone is now provided, with a low spring pressure and fabric instead of leather facing, a few firms still persist in using comparatively small cones and the high spring pressure which is therefore required. As clutch pedals are almost invariably direct acting—the leverage is not increased by linkage—a “heavy” clutch results. This small cone and high spring pressure occurs in one or two new models, the 2 ton Commer for instance.

In clutch coupling shafts the fabric disk type of flexible joint is displacing the metallic type in one form or another, though occasionally one of each is fitted, the all-metal joint then being of the pot type with square sliding blocks on a T ended shaft.

Gearsets

Ball-bearings for gear-shafts, the latter splined, are general, and in 90 per cent of gearsets the shafts are side by side. The operating lever is on the right in 88 per cent, with exposed selector mechanism. Only infrequently is provision, apart from spring-backed plungers, made for locking the selector rods which are out of use. The new 4 to 5 ton Bristol has something quite out of the ordinary in selector mechanism, the striking forks in the box being “selected” by a lug on the semi-rotating shaft of the centrally placed gear lever, which is some 24 in. in front of the gearset.

One or two new models, notably the new 1½ ton Albion, have adjustable stuffing boxes, with felt packing, at the ends of the main gear shaft to prevent oil leakage; the gland nuts have radial holes for the insertion of the tip of a “tommy bar” when an adjustment is made.

Propeller Shafts and Universal Joints

The semi-enclosed propeller shaft, which is noticed on quite a large proportion of the American truck chassis at Olympia, has made a little headway among British makers. As a rule (69 per cent) the whole length is open; the semi-enclosed comes next (18 per cent) and the

all-enclosed last (13 per cent), the percentages given not including the coupling shaft between the gearset and countershaft when chain drive is used. The principal adherents of the semi-enclosed propeller shaft are Commer (one model out of four); Dennis (two out of three models) and Leyland (all five models). Open propeller shafts, if of any length over 48 in. or so, are tubular and up to 3¾ in. in diameter. The new Bristol, for instance, has a shaft 60 in. long and 3½ in. outside diameter, while in the new 3 to 5 ton Straker-Squire the shaft is of 3¾ in. diameter and over 100 in. in length with star joints at each end.

Of universal joints there is a considerable variety. The star or ring type with plain bearings for the pins occurs at both ends of 19 per cent of open shafts and with ball bearings in 14 per cent. Fabric disks are used on 32 per cent, block (sliding pot) joints occur at both ends of 2 per cent, while 33 per cent have a star at one end and a block at the other.

The flexible disk of fabric has made a great deal of headway and is being used on chassis of all sizes. In the larger type the most approved practice is to build up each disk of a series of units ¼ in. thick. These units are usually formed of eight plies of rubber impregnated fabric vulcanized together and riveted between bolt hole plates of various shapes. The plates preserve a clearance between the units of the whole disk and allow more flexibility without stressing the fabric. Where this plan has not been followed disks have often had a comparatively short life, and one of the vehicles at Olympia had one-unit disks which showed signs of early disintegration, although the chassis was new and had merely been run on its road tests.

The lubrication of metallic joints is not particularly well carried out in a number of cases, the joints often being exposed or at best enclosed in leather casings. In isolated instances, the lubricant is introduced by an oil or grease gun into a hole at the center of star joints, its escape at the outer ends of the bearing pins being prevented by the use of blind bushes.

Final Drives

The increased popularity of the worm drive—usually a straight worm, overhead—is a feature of the show. The internal gear type is not used on British trucks with one exception—the Lacre, the only well-known make which was not at Olympia. Side chains are still prominent and



Front of A. E. C. View shows prolonged second leaf of springs, tubular cross member, folding starting crank and radiator with row of plain tubes in front of main group which are gilled

have not lost must ground; they are used on 23 per cent of British trucks, worm on 52 per cent, double reduction gearing on 20 per cent and straight bevels on 5 per cent. In the latter category the Swiss Saurer is rather notable; it is shown at Olympia in its latest form with an unenclosed propeller shaft and a straight bevel final drive giving an 8 to 1 reduction from a 7-tooth bevel pinion.

When chains are used they are in nine cases out of ten completely enclosed and run in oil. Hallford, Commer (two models), Enfield and Allday are examples of the practice, the last two utilizing the back panel of the chain case as a radius member. Albion and Churchill chain driven models, on the other hand, have exposed roller chains.

Rear Axles

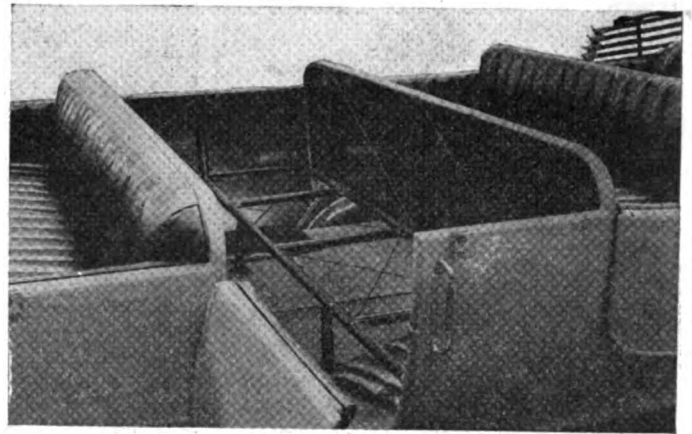
In the worm driven vehicles the favored axle design is similar to that appearing on some American truck chassis at Olympia, viz., a cast steel center with an opening at the top into which the worm and wheel are lowered with their bearing housings as a unit with the top cover of the casing. Wheel extensions integral with the center and as separate bolted-on and flanged units are equally numbered in this class of axle construction, which is closely followed in favor by the banjo type embodying a forged ring center with wheel extensions integral. The ring center is arranged horizontally for worm drives, and is enclosed above by the worm and worm wheel housing and cover plate, and below by an oil sump; for bevel or double reduction gears the ring is, of course, vertical, the gears in each case being mounted as a unit with the front cover.

Ball bearings are general for axle centers, but the majority of the trucks of over 2½ tons capacity have plain bearings for the wheels, usually of the floating variety but fixed in one or two cases—Albion for example.

The declining use of axle trusses is a noticeable feature of British back axles; they are rarely found except on built-up axles and not on all of those. Before the war a truss was almost general practice; integral exterior webs are now favored instead.

Wheels Seldom of Wood

It is quite exceptional to find wheels of wood, and the disk wheel has lost a lot of ground, except when twin pneumatic tires are fitted—in the latter case the Michelin single disk type is used as a rule. The solid tired disk wheel, built up of two disks, the inner one flat and the outer dished with the apex of the cone near the hub end, has not, however, disappeared. It is still used by such



Charabanc body shown by Morgan has airplane system of frame construction, viz. tubular members braced by steel wires. Same principle is being applied to touring car bodies by this firm of coach-builders

well-known firms as Maudslay (one on model) and Thornycroft on all models.

The web spoked cast wheel has also lost a lot of ground, both it and the disk having been very largely superseded by the cast steel type with round spokes numbering either six or seven, usually the latter. The spoke ends are considerably flared in many cases where they run into the flat rim, though there is a wide diversity in design at this point. This type of wheel appears on 55 per cent of the trucks at Olympia, disk wheels on 21 per cent, web cast wheels on 15 per cent, wood and miscellaneous types on 9 per cent.

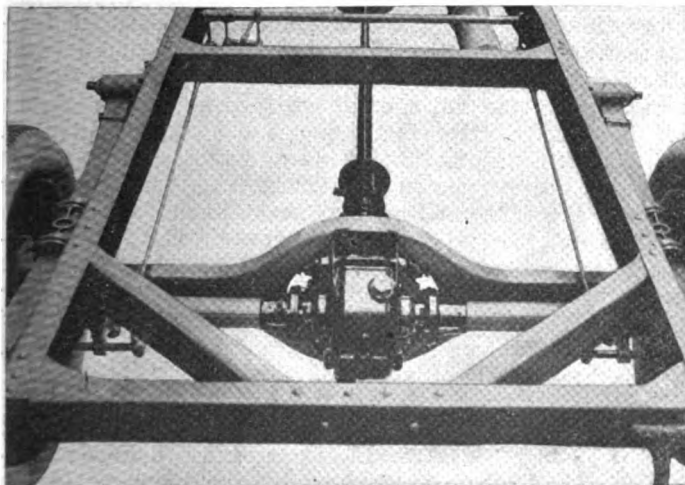
Brake Tendencies and Location

In regard to brakes, general practice is to fit contracting type shoes acting upon a drum on the transmission behind the gearset and expanding shoes within wheel drums; in isolated cases an expanding transmission brake is arranged either in front (Guy, for example) or behind (Halley) the final drive on the rear axle casing. The transmission and wheel drum combination is used on 77 per cent, only 13 per cent having both pedal and hand operated shoes within the wheel drums; there is not one example of an external wheel brake.

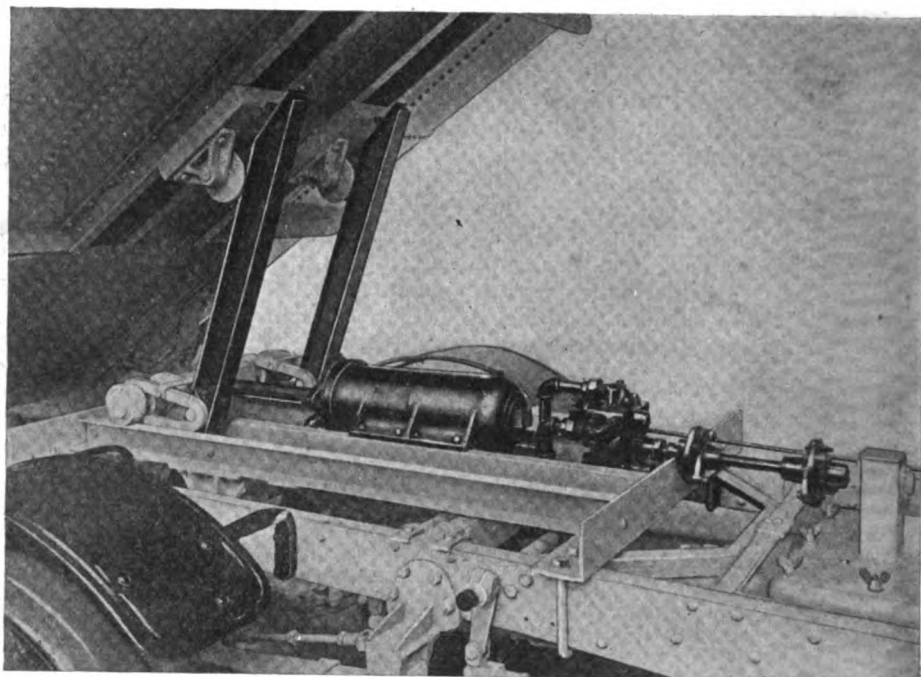
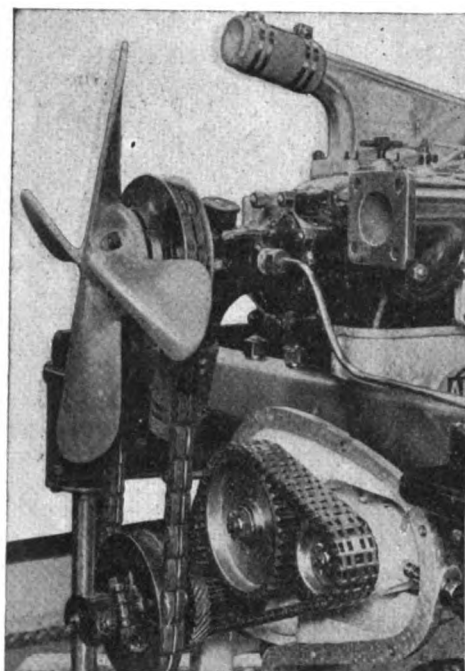
In connection with wheel brakes two tendencies have developed. The first is to leave the shoes exposed at both sides within the drum, and instead of attempting to exclude mud it is allowed to enter and find exit with equal freedom; the drums are merely rings of cast steel with lugs to secure them to the wheels. The second tendency is to increase very appreciably the area of friction surface, generally by the use of drums of greater diameter than were used prior to the war. The new Bristol 4-tonner, for example, has 18 x 4 in. wheel drums, and the Straker-Squire 22 x 7 in., though the latter is one of the few chassis with two pairs of shoes in each drum and no transmission brake. Generally, too, shaft drums are larger and wider, but there are notable exceptions, the Commer 2-tonner, for instance, having at the rear of the gearset a shoe brake with the drum only 8 in. diameter x 4 in. wide, as compared with the Bristol 14 x 4 in.

Steering Gear and Connections

The worm and segment type of steering is widely used, the exceptions being of the worm and nut pattern. Complete worm wheels are not usual, nor is any means for adjusting the meshing of worm and wheel, or side play of the worm wheel shaft. The Bristol has a commendable arrangement to these ends, the shaft being carried



Vinot differential and internal drive casing is carried by pressed steel member on the extensions of which the road wheels are mounted



To the left—Front of A. E. C. engine with timing case cover removed. View shows cross member from which front of engine is suspended by two bolts, water accelerator or pump casing at rear end of fan shaft, and— at bottom right-hand corner—draw bolt for adjusting chain. To the right—Close view of Daimler hydraulic tipping gear, showing pump, ram cylinder and linkage of lifting levers

in plain bushes located in the split ends of the gear housing extensions by pinch bolts; the bushes have a slightly eccentric bore for mesh adjustment and can be moved axially to take up side play.

Ball ends for the steering levers are most in favor, but the design of rod ends varies considerably; the rods may have capped ends secured by two or three bolts, or tubular ends with a threaded plug, the cap or plug forming half the ball socket; to secure the plug the usual provision is a pinch bolt, the pre-war plan of using a split pin through tube and plug having been discarded. On the other hand, a short universal link between eyes on lever and coupling rod is often seen, and here again there is diversity of method in applying the principle.

In respect to swivel axles and steering pivots there has been remarkably little change since 1913, and yet there is plenty of room for it. That is to say, there are only a few half-hearted attempts to make the prolongation of pivot pin axis intercept the point of tire contact with the ground. Vertical pins appear in 72 per cent of axles and inclined in but 28 per cent, but even in the latter the inclination is slight and despite a slight splaying of wheels there is often 2 in. difference between pin axis prolongation and tire contact at the ground. With the majority of vertical pins the difference amounts to over 4 in.

General

There are very few "assembled" details in British truck chassis. Only a few firms use engines other than those made by themselves. The Dorman & Tylor engines are utilized by W. & G. and A. E. C. (one model) respectively, and by one or two other makers. But gearsets, clutches and back axles are made individually.

Each truck maker, too, has his own ideas, and arranges that they are adopted, in connection with frame sides, cross members, front axles, steering gear, controls, radiators and other items. Naturally, these special designs with comparatively small outputs—twenty per week is considered a good showing—means high cost of production in respect of the chassis as a whole, and the following may be taken as typical of British prices for chassis of the capacities named, with solid tires in each case:

30	cwt.	(3,360 lb.)	£725—	£900	(\$3,625—\$4,500)
2	ton	(4,480 lb.)	£900—£1,025		(\$4,500—\$5,125)
2½	ton	(5,600 lb.)	£900—£1,120		(\$4,500—\$5,600)
3	ton	(6,720 lb.)	£1,000—£1,200		(\$5,000—\$6,000)
4	ton	(8,960 lb.)	£1,050—£1,300		(\$5,250—\$6,500)
5	ton	(11,200 lb.)	£1,240—£1,440		(\$6,200—\$7,425)

Imported Chassis

Among the imported trucks exhibited are eighteen of American manufacture, these including Federal, Garford, G.M.C., Hawkeye, Overland, Packard, Selden, Traffic and Republic.

There are seven French makes, among them Brasier 3½ and 5 ton models; the former on pneumatics (Michelin), twin and single, and having a tire pump consisting of oscillating plungers enclosed within and operated by a hollow friction wheel over the flywheel.

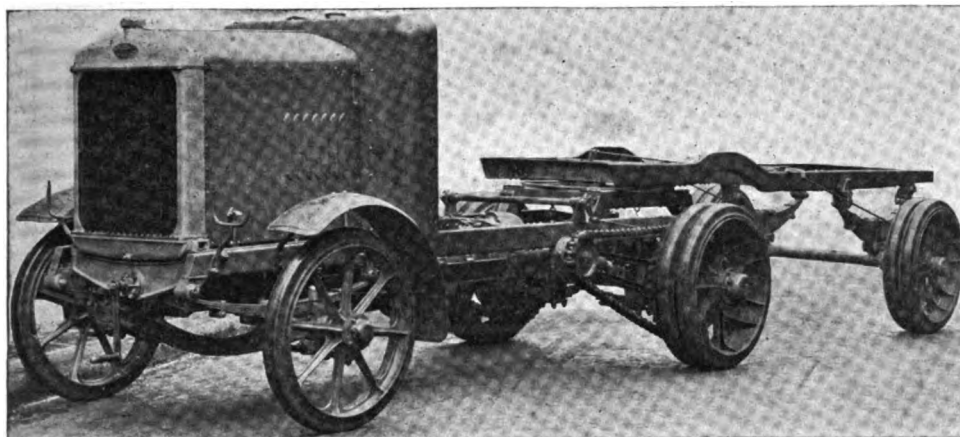
Delaunay Belleville has a four-wheel drive tractor with a wheelbase of 134 in. carrying 2½ tons and hauling loads up to 25 tons on a trailer. The tractor engine has four cylinders 5 x 6¼ in. and is under the elevated driving seat.

Panhard has 30 cwt. and 3 ton trucks, the first with a four-cylinder side valve engine 3½ x 5½ in., and the second a sleeve valve four-cylinder 3¾ x 5½ in., both with Michelin pneumatic tires.

Renault has a display of five trucks from 1 ton to 7 tons capacity, the latter and a 5 ton model having bevel drive to the back axle and a final reduction by means of planetary gearing in each back wheel, the sun and planet pinions being exposed by the removal of a 16 in. cover plate which displaces the usual hub cap; the largest model has a 5 x 6¼ in. engine, with the radiator at the front of the dashboard as in all others.

Unics are represented by a taxicab and two trucks for 30 cwt. and 2 ton loads. The latter are of similar design, but the heavier has a very neatly arranged double reduction drive and a long pressed steel torque member with a front extension in the form of a laminated spring.

Two features of note are apparent in the 30 cwt. Vinot chassis, i.e., a pressed steel load-carrying rear axle with a



Scammell tractor with semi-trailer. Brakes on trailer wheels operated by plunger passing through hollow central pivot of trailer table. Engine has bore and stroke of 5 x 5½ in. and overhead push-rod operated valves in detachable head

separate casing for the differential and the shafts of the internal gear drive, and a large oil filter mounted high up on the front face of the dashboard, a method of making this unit accessible which might be adopted after it had been omitted from the crankcase design.

De Dion shows several examples of truck chassis, one completed as a street cleaner and sprinkler, but the star among the imported chassis, so far as exterior finish, if not complexity of design, is concerned, is the live axle Saurer for 2 ton loads. Every detail of its 4 x 6¾ in. engine and chassis has a finish which would eclipse the majority of private car chassis at any exhibition. But beyond this, the number and character of the mechanical refinements are—well, almost awe-inspiring.

New Ideas in Saurer

The Saurer "engine brake" is fitted; so is a connection between starting handle and magneto to retard the timing for starting; there are throttle, engine brake and ignition levers over the steering wheel and a hot air control on the dash. A throttle governor cuts out at 1000 r.p.m. on the indirect gears, but by linkage running back to the gearset the maximum speed is reduced to 800 r.p.m. when the top gear is engaged. A helical keyed coupling drives the magneto and by this means the ignition timing is varied—a Saurer plan for fourteen years past. The engine lubrication system comprises tandem plunger pumps, one of comparatively large capacity circulating the small quantity of lubricant in the crankcase and the other serving constantly to add small supplies from a reserve tank to make up loss.

The Saurer engine has block cast cylinders and the engine and gearset are mounted as a lengthy unit from three points, a pair of pressed brackets supporting the rear end and a central trunnion bearing the front. The flywheel and cone clutch are semi-enclosed, the flywheel having a steel extension with five circumferential tongues made by saw cuts to form flexible sections for first engagement of the cone. The rear wheels are canted, a limited amount of universality for the hollow drive shafts being obtained by making each of the

latter in two parts with a form of dog clutch engagement between the units. Both sets of brake shoes expand within the rear wheel drums, which are of 22 in. diameter and 7 in. wide. This 2-ton chassis is sold at £1,280 (\$6,400) in England, the 5-tonner being priced at £1,800 (\$9,000), with 4¾ x 7½ in. engine.

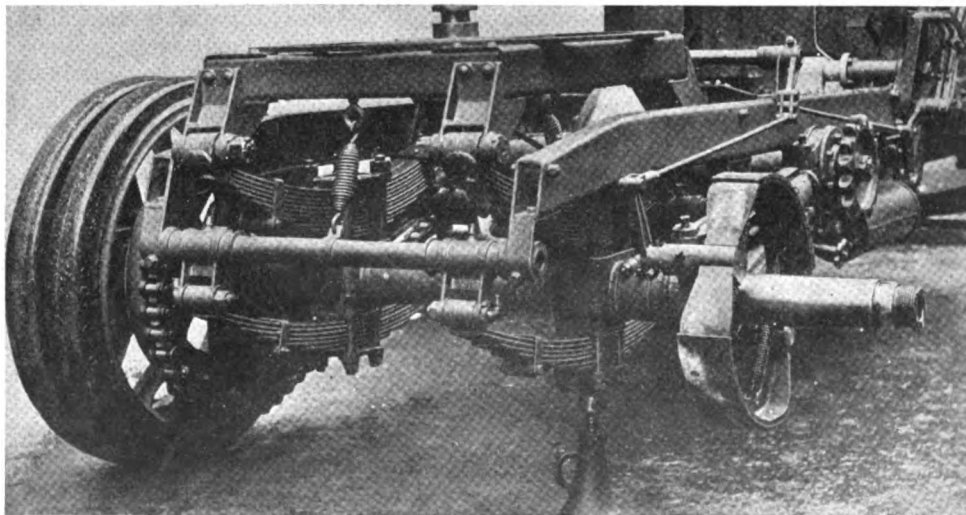
Fiat has a full display consisting of five trucks, a taxicab, an ambulance and an agricultural tractor, the only special feature being a rear and side tipping gear, hand operated. Saurer also shows an hydraulically operated gear for tipping to either side or to the rear; the body in this case is mounted on four pedestals with spherical ends and is locked to two of the four points of support when being tipped in one direction or another; the

connections from the ram are universally jointed links which adapt themselves to the various movements of the body irrespective of the direction of tip.

International Patent Agreement

ON June 30 an agreement was entered into between France, Germany, Netherlands, Poland, Portugal, Sweden, Switzerland, the Czescho-Slovak State and Tunisia with reference to the maintenance and re-establishment of the industrial property rights affected by the World War. Under this agreement, any patent or design patent applications which were made in one of the contracting countries after Aug. 1, 1913, can be made in any of the other countries during the next six months, as of the date of the original application. The same applies to trademarks applied for after April 1, 1914. Inventors having made applications for patents in their own country can secure full protection in the other countries, except that any firms in the other countries which have already used the patent in question have the right of prior use.

THE (British) Fuel Research Board seems to favor the use of town gas and coke oven gas in motor omnibuses and passenger cars, and, given light and safe containers and suitable roadside refilling stations, apparently believes that great economy will result from its use.



Rear end of Scammell tractor; showing table frame of trailer mounted independently on semi-elliptic springs

A Compact Battery Ignition System

A novel arrangement combining usual battery ignition units into a neat assembly resembling the magneto in appearance and method of connection with engine. Is design of a Belgian engineer, Vital Paquit. Advantages include simplicity in construction and absence of high speed parts.

SINCE high tension battery ignition has become the standard for passenger car engines, the elements of an ignition system, aside from the current source, include the coil, the interrupter, the condenser, the distributor, the switch and the wiring. For engines of four or more cylinders none of these elements can be left out, and no more are required, hence there is a certain similarity in all battery ignition systems, in that all comprise exactly the same parts. But in the construction of these parts and in their relative arrangement there is considerable latitude, and it is upon these details that ignition experts are expending their ingenuity.

The system illustrated herewith, and which is due to Vital Paquit, a Belgian engineer, comprises all the elements of the conventional battery system, but some of these parts are of quite different design and the whole is neatly combined in a compact and substantial unit which fits the standard magneto base and drive shaft and resembles a magneto in appearance.

The approach to the magneto form of outline has been chosen not for the purpose of deception but because it possesses practical advantages. In this form all of the elements of the magneto system with the exception of the switch—and this is an advantage which has often been claimed for the magneto—are combined in a single assembly, with the result that the outside wiring is reduced to a minimum. In fact, the wiring is exactly the same as that of a magneto—a high tension cable from the distributor terminals to each of the spark plugs, and a single low tension cable from the instrument to ground, this circuit including the battery and the switch.

Has Appearance of Magneto

The instrument can probably be best described with reference to its similarity to a magneto. The space ordinarily occupied by the magneto armature is here taken up by the high tension distributor. The distributor shaft naturally must be driven at such a speed that it makes one revolution during the period of one engine cycle; that is, it must be driven at one-half crankshaft speed.

The high tension distributor is that part of the Paquit system which differs most radically from the corresponding part of the conventional battery ignition system. It consists of a drum of bakelite, which is molded to a knurled steel shaft, and is provided, in the case of the four-cylinder magneto, with two distributor segments of brass,

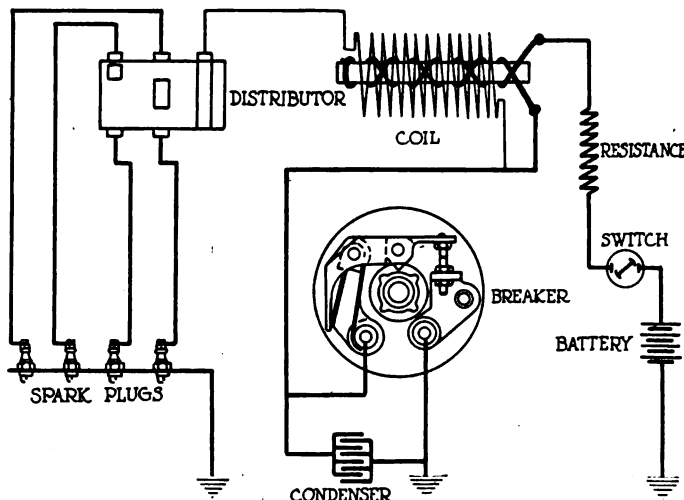
molded into the bakelite. These distributor segments are offset relative to each other in the direction of the length of the distributor drum and arranged at quarters circumferentially. Adapted to make electrical contact with each distributor segment are two distributor brushes which are guided in brass brush holders, molded into bakelite side plates, secured to the sides of the aluminum base casting. The brush holder extends to within 1/32 in. of the surface of the distributor drum and thus prevents shattering of the brush.

The brush-holders are in the form of L shaped brass fittings, the horizontal portion of which contains the brush and the vertical portion of which extends up through the side plate of bakelite, and forms a dowel socket for a pin on the top portion of the ignition unit, which contains the coil. In a four-cylinder ignition unit there are four of these dowel sockets and connections. The dowel pins, which are connectors of the snap type, are molded into the bakelite upper section of the ignition unit, and connections extend from them to the high tension terminals, which are located centrally in the top of the coil housing.

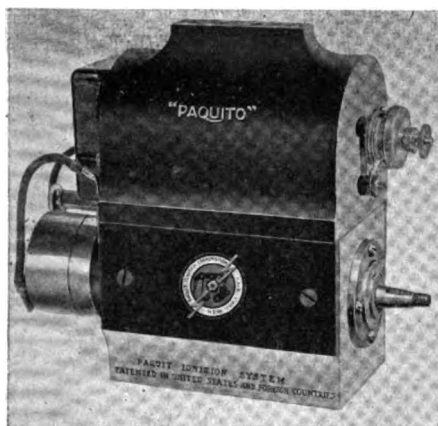
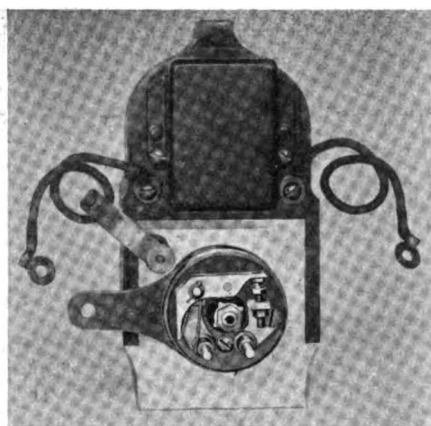
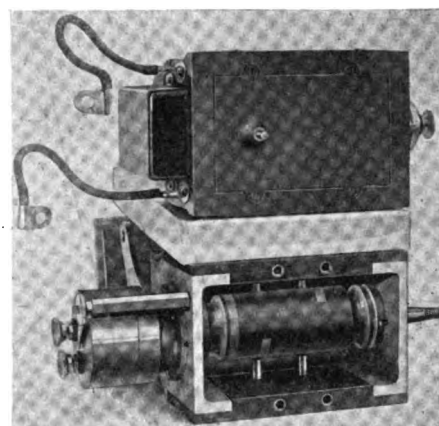
The interrupter is located at one end of the distributor shaft, and is very similar in construction to a magneto interrupter. The cam for operating it is forced by a nut against a conical portion of the shaft. This cam has as many lobes as there are cylinders to be fired. The interrupter housing is made of brass, in two parts, one forming the base on which the interrupter parts are mounted, and the other the housing proper. The insulation plate of cream colored fiber is secured to the base. The interrupter arm is of bell crank form, one arm carrying the movable contact point and the other the cam follower and the two straight, flat interrupter springs. The contact points are made of platinum-iridium alloy and they open about 0.010 in.

Details of Interrupter

As the interrupter shaft makes one revolution for every two revolutions of the engine crankshaft, the interrupter cam must be provided with a number of lobes equal to the number of cylinders to be fired. A cam follower or shoe of bakelite is used, and we are informed that after 3500 miles of operation with one of these ignition units, no wear on the shoe could be detected. The cover of the interrupter is held in place by the nuts on the two binding



Wiring diagram of four-cylinder system

*Paquito ignition unit**End view, showing breaker**Upper and lower parts on side*

screws from which connection is made to the condenser, while the entire interrupter housing is held in place by means of the usual flat spring supported by a post.

The condenser, which has mica insulation, is provided with a metal cover and secured to end of the coil housing directly about the interrupter, hence the connections from the interrupter to the condenser are very short. The condenser has a capacity of 0.891 microfarad. The object of mounting the condenser in a separate cover outside the main ignition unit housing is to make it easily removable in case repairs should be needed.

As already pointed out, the coil is enclosed in the upper bakelite part, which has an opening at the bottom, closed by a rectangular plate of bakelite. The high tension carbon brush projects downward from this upper section of the ignition unit and bears on a brass contact ring in the distributor drum. On the opposite end of the coil from the condenser is mounted the regulating resistance, which is connected in circuit with the primary winding of the coil. The object of this resistance is to make the current consumption more nearly equal at high and low speeds, respectively, and it also prevents burning out of the coil in case the switch should be accidentally left closed. This resistance consists of a small coil of fine nichrome wire which is curved around a porcelain block, the wire being bare and exposed to the atmosphere, so as to facilitate the radiation of heat from it. It is claimed to be

absolutely impossible to burn out the coil, even if the engine should be stopped when the interrupter contact is closed.

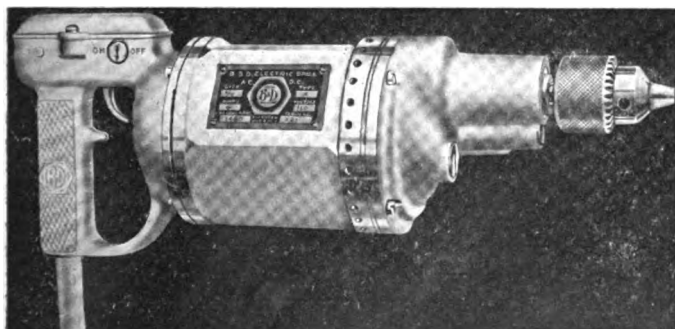
The distributor shaft is mounted on two Norma ball bearings, which require a few drops of oil every 5000 miles. These bearings are mounted in bearing plates of brass. The same base and rotor are used for both four and six-cylinder ignition units, but the interrupter cam has a different number of lobes, and there are also a different number of high tension terminals. It is a very easy matter to convert a machine from right-hand to left-hand rotation, as all that is required is to readjust the interrupter cam, which is held in place by pressure. Owing to the construction of the interrupter, the instrument must be so linked up on the car that with the spark lever in full retard position, the engine fires $\frac{1}{4}$ in. over dead-center.

Ignition units for eight and twelve-cylinder engines will also be made, but they will have a different base from the units for four and six-cylinder engines. The high tension terminals will be arranged in two lines instead of in a single line.

Among the advantages claimed for this system are that it is exceedingly simple in construction and that there are no high speed parts, consequently the parts should wear well. The system produces an effective spark, and even when the battery is so low that the horn can no longer be operated, it gives a spark that will fire a good charge.

Body Builders Electric Drill

DRILLS for use in the manufacture of automobile bodies should be easy to handle and in addition have speed and endurance, because the work involves quantity production and therefore calls for continuous use of tools. A special 5/16 in. drill for this purpose has been designed by engineers of the Black & Decker Mfg. Co.

*B & D electric drill*

The gears of this "body builder's special" are hardened and mounted on ground shafts. The light weight of the drill results from the use of aluminum for the motor and gear casing. The motor is cooled by forced circulation of air through the field frame and armature winding. It develops $\frac{1}{4}$ hp. and gives the drill a no-load speed of 1480 r.p.m. The control is by means of a pistol grip and trigger switch.

The drill is equipped with a three-jaw chuck for straight shank drill bits up to 5/16 in., 15 ft. of duplex electric cable and separable attachment plug. It runs on either alternating or direct current and is furnished for either 110 v., 220 v. or 32 v.

APPARATUS has been set up at the Bureau of Standards and tests commenced to determine the performance of fan belts for the Motor Transport Corps. The apparatus consists of a motor driving a typical automobile cooling fan by means of a belt; the slippage can be determined by means of revolution counters attached to the motor and the fan pulley.

Conservative Body Lines Predominated at New York Salon

Cabriolet a favorite on many chassis. Angular lines abandoned in general in favor of slightly rounded corners and surfaces. Many wire wheels used, especially on foreign chassis, but disk wheel is gaining in popularity. Crowned mudguard with pocket for carrying spare wheel is popular. Inclined windshield is being abandoned on majority of enclosed bodies.

By George J. Mercer

MANY of the bodies shown at the New York Salon are exact reproductions of those exhibited at the last Salon. Radical departure in lines is seldom in evidence in more than one or two models at this annual exhibit. Conservative lines always predominate while refinement and attention to details are quite the usual thing.

In spite of a similarity in lines to those of bodies shown last year, there is nothing stereotyped in this resemblance because there is always something a little different in the trimming design and color, the paint finish or the appointments.

Quantity manufacturers are generally disappointed in the Salon for the designs exhibited do not accurately represent the popular type for the coming year. The exhibit is usually marked by progressive conservatism and the central idea is to show bodies of the town car class.

The town cars were well represented and varied in design. These included the brougham, one of which was shown by Brewster, with solid quarter panel, steps in place of runningboards and six fenders, as well as the more popular cabriolet. The foreign cars particularly favor this latter type of body. In fact, European cars have ever been partial to the falling top. During the war, when European influence was less felt in body design, the falling top body was seldom seen for other than town car use. The sedan and the coupe were also exhibited. It will be seen by reference to the accompanying cuts that where the body lines are rounded, the effect is more harmonious than in those bodies with the more severe straight lines. The majority of the bodies were of this class, indicating that the day of the angular line has vanished in favor of smooth slightly rounded surfaces. The slanting windshield for closed bodies is also disappearing. Hardly a closed body was to be seen in which

the front was not nearly perpendicular. A slight rake of about $\frac{3}{4}$ in. is good to avoid light flashes from street lamps.

The roofs also looked best on those bodies, in which the edges were rounded to blend with the side and back panels, the point where one begins and the other ends being lost. This makes the roof appear a trifle heavier, but for work of the type shown, extreme lightness in appearance is not an essential. The majority of the bodies are smaller than in years past, and thus are actually lighter than heretofore.

Wire wheels were used to a larger extent than last year. This is due to the greater number of foreign exhibitors. The wire wheel has been replaced to a large extent among American manufacturers by the disk wheel, which will be used still more extensively when the difference in cost of production becomes less.

The long, full-crowned mudguard was by far the most used, and the front guard was pocketed on many cars to carry the spare tire, as will be seen by accom-

panying cuts of the Rolls-Royce, Brewster, Winton, Rubay, Sunbeam, Fleetwood and Delage.

Pillar lamps were rarely used and dash lamps were used on perhaps half the cars.

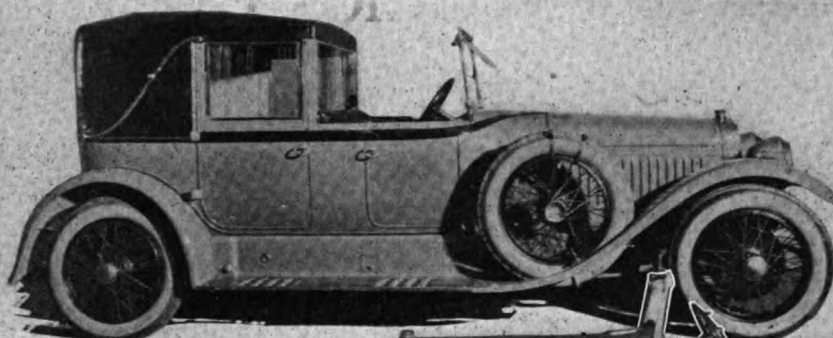
Many of the touring bodies had lower sides than usual, examples of this being mounted on the Daniels, Winton and Lanchester chassis. An effort to make the touring body appear like a runabout body was noticed, the apparent intention being to secure the comfort of the one and the appearance of the other. The appearance of a very low-sided, close-coupled four-passenger touring body with carrying space back of the rear seat is similar to that of the speedster type, but some of these bodies had more of the runabout appearance than the average speedster has.



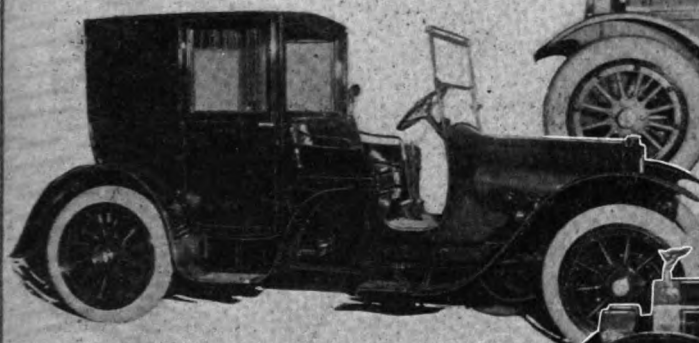
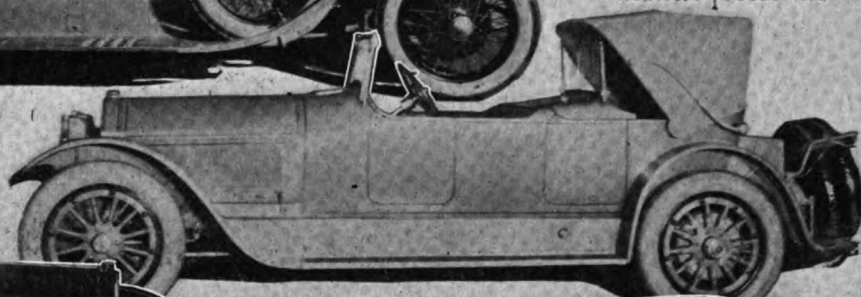
Minerva with movable seats, showing foot pillows and location of instruments

Representative Bodies Exhibited at New York Salon

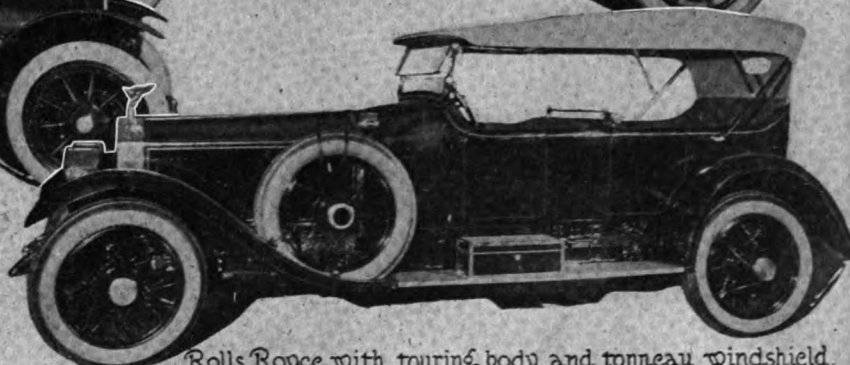
Delage fitted
with compact
cabriolet body
having wide belt
moulding stripe.



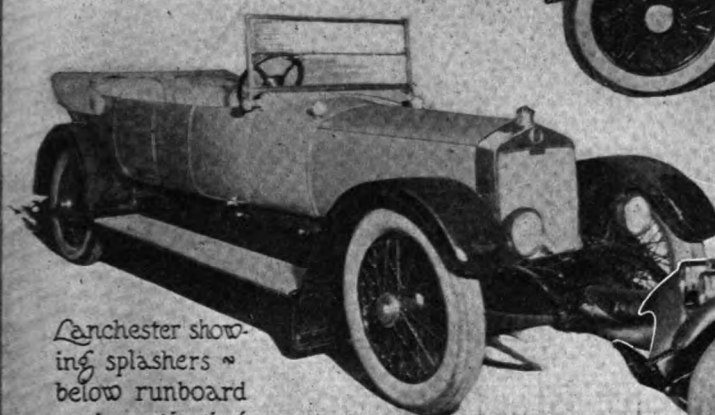
Locomobile show-
ing extension of
second cowl for
tonneau protection.



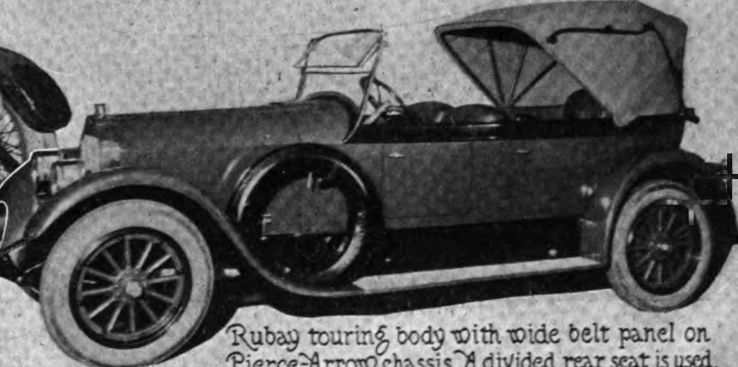
Brewster with town car having
steps and six fenders. ~ ~ ~



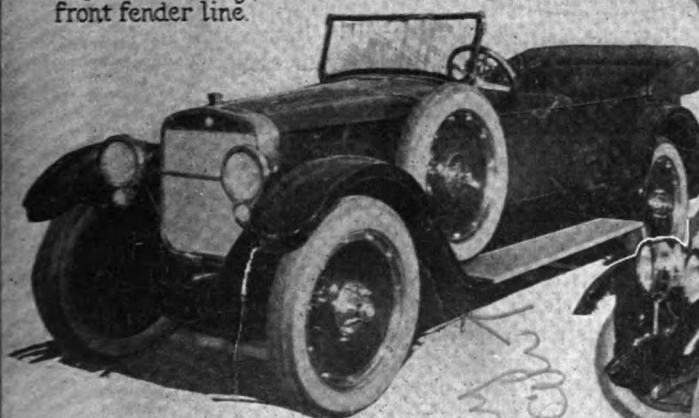
Rolls Royce with touring body and tonneau windshield.



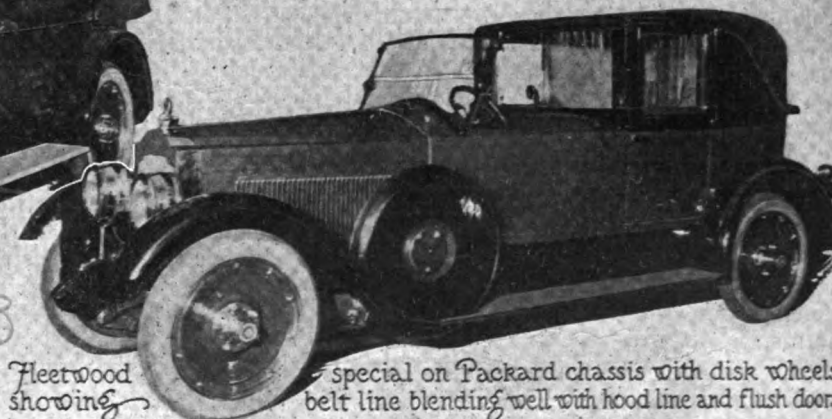
Lanchester show-
ing splashers ~
below runboard
and continuing
front fender line.



Rubay touring body with wide belt panel on
Pierce-Arrow chassis. A divided rear seat is used.

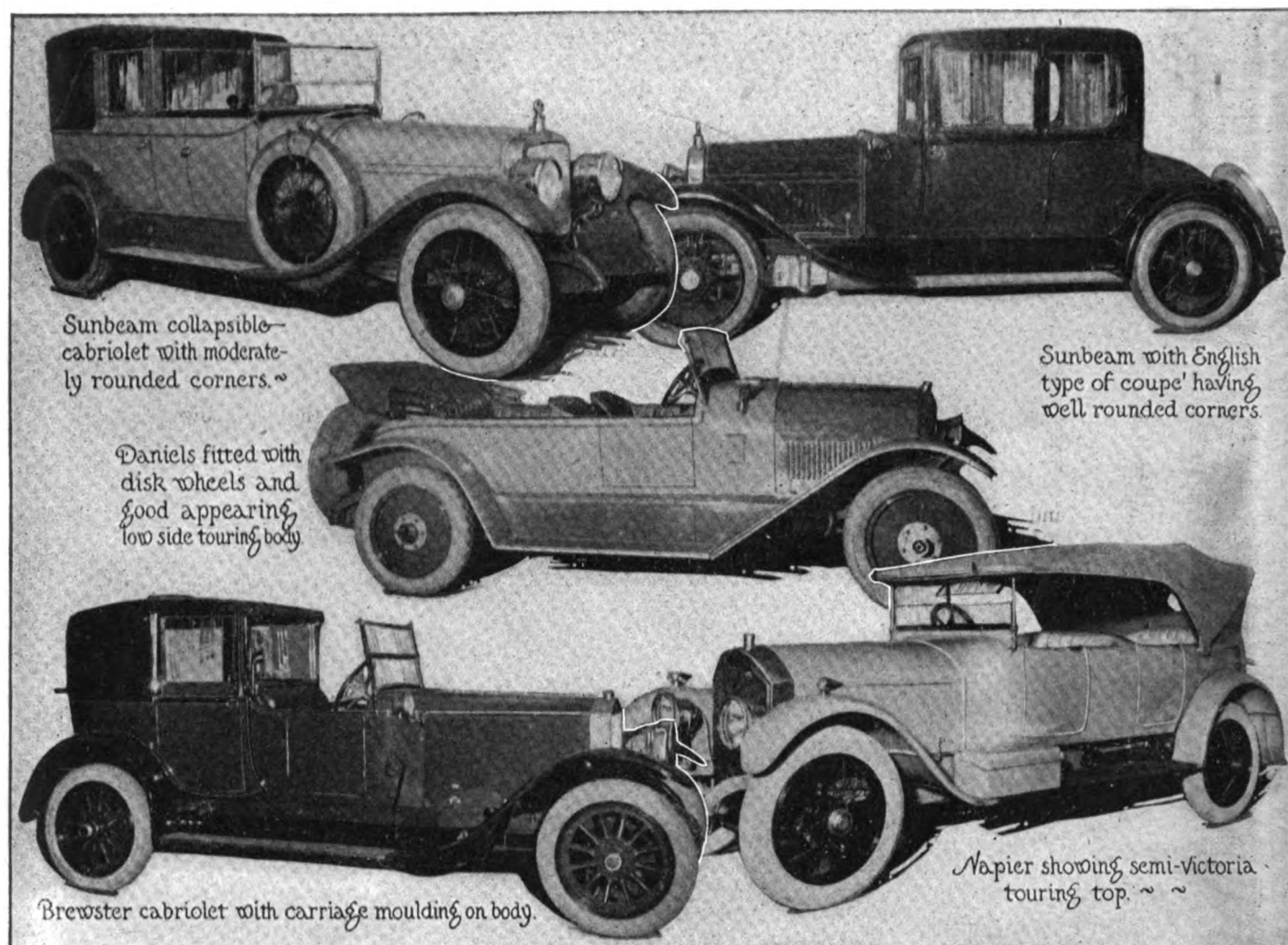


Winton with touring body and disk wheels.



Fleetwood
showing

special on Packard chassis with disk wheels,
belt line blending well with hood line and flush doors.



The front part of the Minerva pictured in one cut shows an unusual arrangement of instruments under the dash, as well as a novel type of runningboard. The sliding front seats, robe rails, victoria top and tonneau windshield are also worthy of careful notice.

Other cuts show a Napier chassis carrying a body with semi-victoria top and divided windshield; and a special body on a Locomobile chassis had a victoria top and an extended second cowl carrying a tonneau windshield. The Lanchester used splashers below the runningboard.

Molding Sand for Light Steel Casting

ACCORDING to R. J. Dunderdale, writing in *Engineering*, the molding sand required in steel foundries specializing in light castings for automotive and similar work differs completely from that used for iron foundry work, and considerably, both in character and treatment from that used for heavy steel castings. Its physical condition should be hard, sharp and not easily friable. Chemically, it should contain 97 per cent to 98 per cent of silica, and as little matter of other kinds as possible, though a small quantity of iron is not objectionable. In regard to size, it is probably as well that the sand itself should not pass through an 80-mesh, as its texture will be rendered decidedly finer than this by the clay used for bonding. The best clays for this purpose contain about 30 per cent of alumina, as little organic matter as possible, and, according to Professor Boswell, a certain amount of iron is an advantage. The sand and the clay to be used should be very thoroughly mixed and milled and the moisture of the resulting mixture can be as much below 4 per cent as will

allow the sand to take a good impression of the pattern and not crumble or fall out when being dressed or turned over.

ALTHOUGH there are places in London and elsewhere where rubber has been used as a road surfacing material over small areas it has hitherto only been adopted for the purpose of deadening the sound of traffic in situations where quiet is essential. The idea of employing rubber on a large scale, however, has long been mooted, but it has been left for the Southwark Borough Council, states the *Surveyor*, to give this question a definite trial on a road subject to heavy traffic—namely, the Borough High Street. Half only of the road is being faced with rubber, so as to afford a comparison in efficiency. The new material is being laid in flat slabs three-quarters of an inch in thickness, attached to steel plates, from which project broadly flanged studs, which are gripped by the concrete foundation.

Effect of Gear Ratio on Car Economy

Methods of obtaining the best car performance with respect to fuel economy when using various gear ratios are outlined by the authors who also deal with other important fundamental factors affecting fuel consumption and give valuable experimental data to illustrate the points made.

By J. N. Golten and Allan Neumann*

ONE of the problems of the hour is that of fuel economy, which to the motor using public is a matter of miles per gallon. Much has been done to increase the economy, and to improve car performance, by the re-design of the engine and various other parts of the car; but in the opinion of the writers the full economic capabilities of the modern engine, or of the car considered as a whole, are not being realized.

After the completion of a new engine or car, the manufacturers generally try out several carburetors, and that apparently giving the best all around performance is selected. Such a decision on carburetor equipment is rarely made in the light of a full knowledge of the car's possibilities.

A comparatively simple method of determining the optimum performance and thus giving a basis for comparison with actual performance, is given in the following paragraphs.

Method of Determining Optimum Performance

For any given car speed S (miles per hour), the miles per gallon (M/G) can be expressed as the ratio of the distance covered in the time T to the fuel consumed in the same time.

$$\text{Distance} = ST.$$

$$\text{Fuel consumption} = (f_m HP_s T),$$

where f_m is the minimum brake specific fuel consumption

*Engineers, Carburetor Division, Stewart-Warner Speedometer Corp.

(pounds fuel per hp.-hour) at the horsepower HP_s , required to drive the car at constant speed S . Therefore,

$$\frac{M}{G} = \frac{CST}{f_m HP_s T} = \frac{CS}{f_m HP_s} \dots \dots \dots (1)$$

C being a conversion factor from pounds to gallons, generally taken as 6.2 for gasoline.

To make this formula usable f_m and HP_s must be experimentally determined and expressed in terms of S .

The method of determining the minimum brake specific fuel consumption is thoroughly described in P. S. Tice's article, "Carburetor Requirements of a Typical Gas Engine," in the June 24 issue of AUTOMOTIVE INDUSTRIES. A brief description of the method is given herewith.

At any definite speed, and at each of several manifold pressures, varying from that at idling to open throttle, the mixture ratio is varied by small steps from the leanest possible mixture at which the engine will run steadily, to a mixture so rich in fuel as to result in an appreciable loss in output. The spark timing is in all cases adjusted to that position giving maximum torque. Fuel, torque and speed readings are recorded during each run. A plotting is then made between P_b (brake mean effective pressure) and f_b (brake specific fuel consumption, lb. fuel per hp.-hour) for each manifold pressure. This will give a series of curves as shown in Fig. 1. A line drawn tangent to the several curves of the group is an expression of the minimum brake specific fuel consumption (f_m) obtainable over the load range at that particular speed. However, the variation in this tangent curve with speed is so slight that it may be considered as being independent of speed.

Car Resistance

HP_s is determined by means of accelerometer tests. (See P. M. Heldt's article, "Acceleration of the Automobile and Its Measurement," appearing in the June 10 issue of AUTOMOTIVE INDUSTRIES.) The car is brought up to a certain speed, power then shut off, and the car allowed to decelerate, accelerometer readings being taken at various speeds. From these readings the HP_s can be calculated by the formula

$$HP_s = \frac{r W_t S}{375} \dots \dots \dots (2)$$

where r is the accelerometer readings in lb. per ton and W_t is the weight of the car in tons. A plotting is now

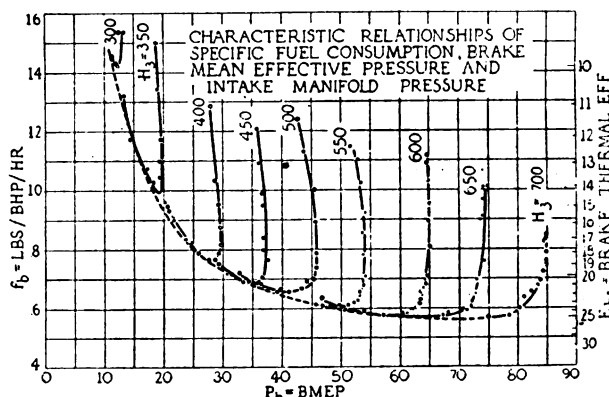


Fig. 1

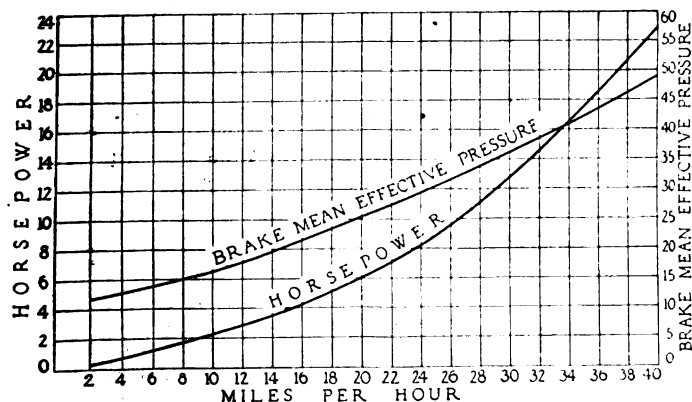
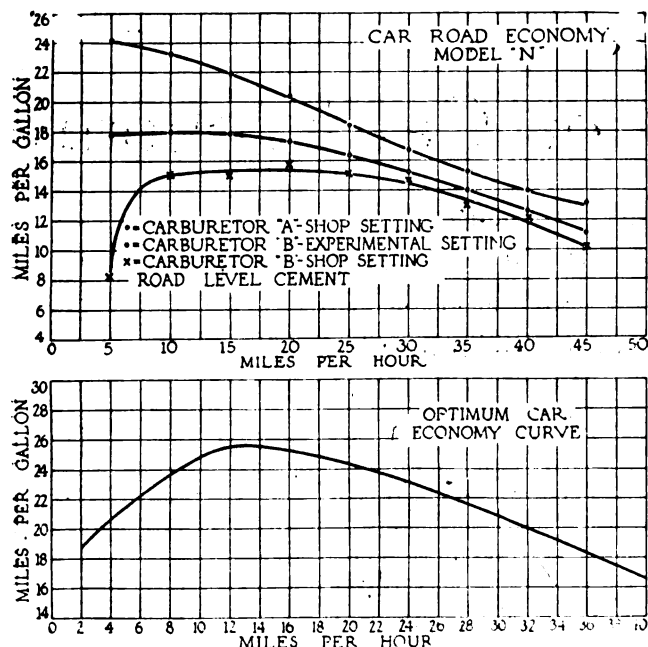


Fig. 2



Below—Fig. 3. Above—Fig. 4

made between HP_s and S , and likewise one between P_s and S , P_s being determined by the formula

$$P_s = \frac{3000 HP_s D}{CLB^2 SG} = K_1 \frac{HP_s}{S} \dots\dots\dots (3)$$

where

$$K_1 = \frac{3000 D}{CLB^2 G}$$

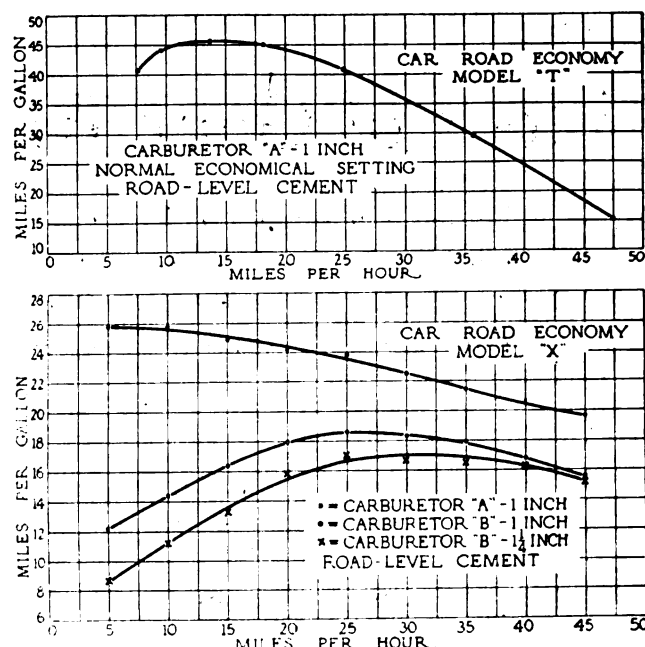
and P_s is the brake mean effective pressure developed by the engine at the speed S . D is the diameter of the rear wheels in inches, C is the number of cylinders, L is the length of engine stroke in inches, B is the cylinder bore in inches, and G is the gear ratio. Typical curves are shown in Fig. 2.

The curve of optimum car economy is determined as follows: At any definite car speed, HP_s and P_s are determined from the rolling resistance curves, and knowing P_s , f_m is obtained from the fuel utilization plot (Fig. 1). Substituting the values S , HP_s , and f_m in formula 1, miles per gallon is obtained. A typical curve is shown in Fig. 3. This curve is a true expression of the maximum economy that can possibly be obtained with that car, engine, and gear ratio, regardless of the carburetor performance. This economy can only be realized in practice when the carburetor compensation is such as to give the mixture proportions that result in minimum fuel consumption at all speeds and loads.

Optimum Performance

These optimum results are rarely, if ever, obtained in practice, due to the fact that the average present day carburetor does not possess the required compensation characteristics. However, some carburetors more nearly realize the desired compensation characteristics than others, with a resulting large increase in economy without sacrifice in performance.

A striking comparison of the results obtained in typical modern touring cars with two carburetors, "A" and "B," is shown in Figs. 5 and 6. Carburetor "A" is non-adjustable, and inherently possesses correct compensation characteristics. Carburetor "B" is a well-known make. In Fig. 4, curve 1 shows the mileage obtained at various speeds with carburetor "A." Curve 2 shows the results obtained with carburetor "B" when adjusted by a carbu-



Below—Fig. 5. Above—Fig. 6

reter factory representative. Curve 3 shows the results with the same carburetor with a standard service setting. The curves in Fig. 5 serve as a comparison between carburetor "A," and two sizes of carburetor "B," on another car. Fig. 6 shows the remarkable economy obtained with carburetor "A" on a light touring car.

Gear Ratio

There is one method of increasing the economy that is not wholly obvious, and hence has been given little consideration, which deserves attention from engineers. Presented as a general proposition, the smaller the gear ratio the better the economy. This can be proven by means of formula 3 and Fig. 1. Assuming a given size car and a given engine performance, the P_s necessary to drive the car at speed S will vary inversely as the gear ratio.

$$P_s = \frac{3000 HP_s D}{CLB^2 SG}$$

As the horsepower necessary to drive the car at speed S is independent of the gear ratio, this may be written

$$P_s = K_2 \frac{1}{G} \dots\dots\dots (4)$$

where

$$K_2 = \frac{3000 HP_s D}{CLB^2 S}$$

A study of the fuel utilization plot (Fig. 1) shows that the minimum brake specific fuel consumption decreases as the brake mean effective pressure increases. Hence at any speed as the gear ratio decreases, P_s increases and f_m decreases. The marked influence of gear ratio is conclusively shown by the curves in Fig. 7. Curve 1 is the optimum economy obtained with a gear ratio of 3.5 to 1; curve 2 with a normal gear ratio of 4.92 to 1; and curve 3 with a gear ratio of 6 to 1.

This increase in economy is always obtained at the expense of acceleration ability and may result in either an increased or decreased maximum speed.

A graphic representation of these facts is shown in Fig. 8. Curve 1 is a plot of engine horsepower against car speed with a gear ratio of 6 to 1; curve 2 is a similar plot for a ratio of 5 to 1; curve 3 for a ratio of 4 to 1; and curve 4 is a plot of the power required to drive the car

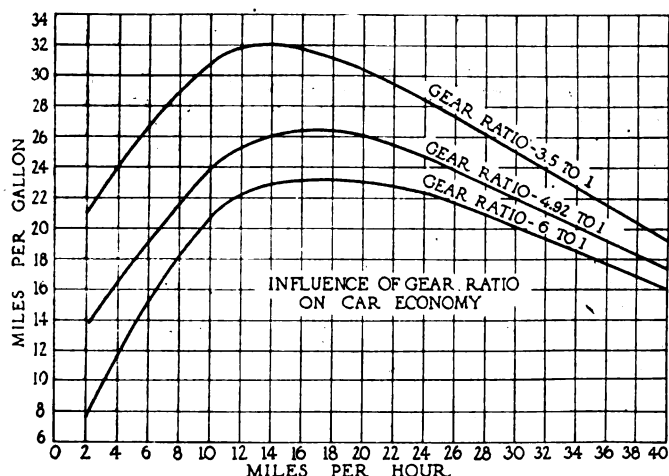


Fig. 7

at various speeds. At any speed the distance between the engine and car power curves is an indication of the power available for acceleration and hill climbing; and their intersection gives the maximum speed. From an inspection of the curves it may be seen that for the largest and smallest gear ratios, the maximum speed is practically the same. For the larger gear ratio the accelerating ability is materially increased at the expense of fuel economy. The intermediate ratio is a compromise as regards accelerating ability and fuel economy, and results in an increased maximum speed.

The fuel situation demands that every effort be made to

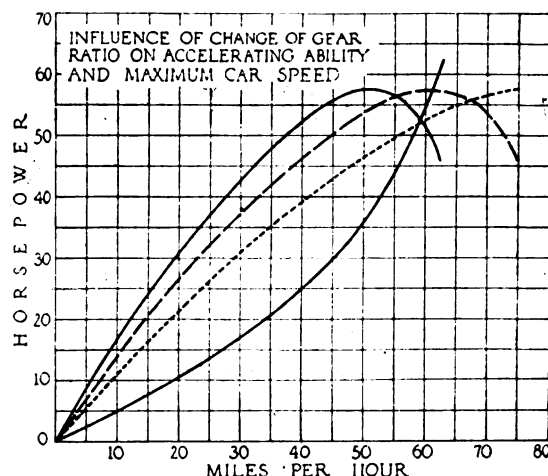


Fig. 8

conserve fuel, consequently, a smaller top gear ratio should be used in the average car, and the public educated to the more frequent use of the gear shift. This presents the problem to the engineers of making the most conveniently operated gear shift. Tests made on a Cadillac car equipped with a two-speed rear axle serve as an example. A 20 per cent increase in miles per gallon was obtained when using the smaller gear ratio.

The high mileage obtained with European cars is not due to superior engine design, but to the use of smaller gear ratios in the final drive. Such gear ratios involve less rapid acceleration.

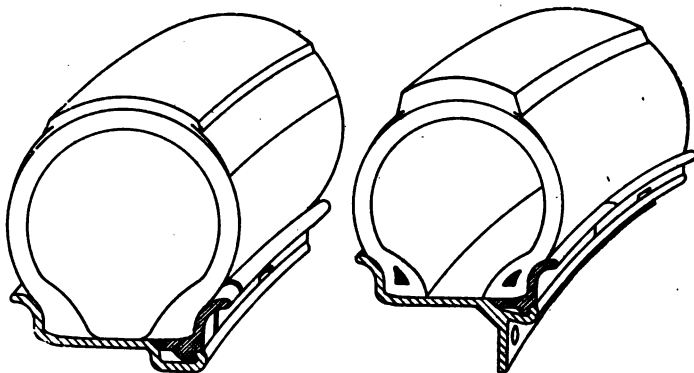
A New Design of Wheel Rim

A WIRE wheel rim and a demountable rim have been developed by the Johnson Rim & Parts Co. Referring to the illustration of the wire wheel rim, the base is made of hot rolled mill section, low carbon, deep-drawing stock, in which there is said to be very little cracking or distortion in cupping or punching. This type of rim lends increased strength to the wheel, being so designed that the front and center spokes come at a greater angle than usual. This at the same time makes it possible to secure the wood wheel tread on most cars. The lock ring is made from high carbon, hot rolled mill section, heat treated. It is claimed that, once this ring is placed on the rim with the tire mounted, there is no possibility of it being thrown off, yet the rim is easily assembled and disassembled. All front and center spokes are laced in the outside channel, thereby permitting the use of shallow cupping and shorter spokes. This outside channel reinforces the outside circumferential surface of the wheel. The low channel shoulder is $\frac{9}{32}$ in. smaller in diameter than the tire base, thus allowing the tire to be readily slipped over it, either on or off. The ring shoulder locks with a 15 deg. grip of the channel shoulder, making it impossible to unlock the ring when the tire is inflated. The pressure of the air in the tire forces the latter against the lock ring itself with an additional locking force of from 70 to 80 lb. per sq. in., which is said to eliminate the danger of the ring being knocked or blown off. A slot, $\frac{1}{2}$ in. in length and $\frac{1}{8}$ in. deep, is cut longitudinally in the ring, so that when the tire is not inflated, the ring can be readily removed by inserting a screw driver into the ring slot and giving a slight upward pressure. The ring then easily comes out from under the bead of the tire.

One advantage claimed for this rim is that it protects

the tire and tube, because the bead of the tire does not come in contact with the nipple heads, most of which are covered by the rim ring.

An illustration is shown also of the Johnson demountable rim. This is provided with a steel flange which covers and supports the outer side of the felloe, protecting it from impact with the curb, etc. At the point where the flange joins the rim, the section is a combination of a "T" and a "Y" bar, which is a form of great strength. Bolt holes are punched through the flange at six equi-distant points and, by means of bolts inserted through these holes, the flange and rim are firmly held in place. The flange entirely covers the outer circumference of the wheel, hence it is impossible to get the rim on wrong. When the rim is put on, the weight of the tire and the rim itself cause the rim to fall positively into its proper position, the flange fitting tight up against the felloe.



Johnson wire wheel and demountable rims

Comparative Tests with a Hot Spot Device

Dynamometer tests made in the engine laboratory of Lewis Institute show an appreciable fuel economy over a wide speed range, smoother low speed, full throttle operation and reduced crankcase dilution with a Losee hot spot device fitted to a six-cylinder engine.

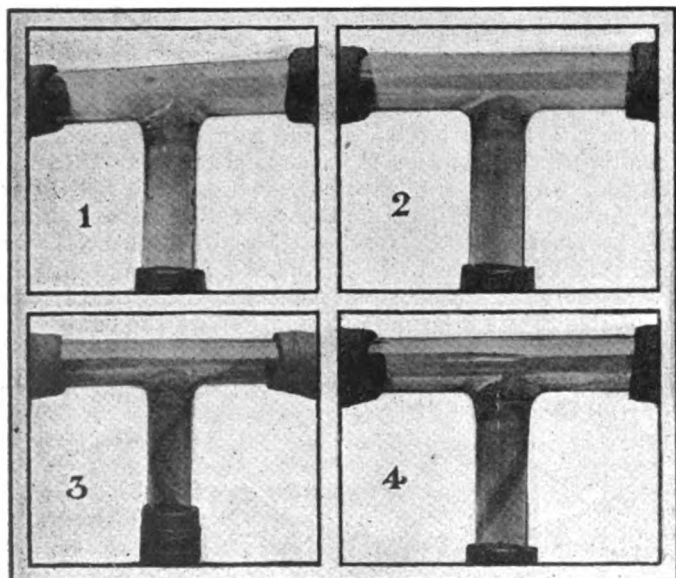
By Roy E. Berg*

IN a report presented by the Society of Automotive Engineers Fuels Committee at the Ottawa Beach meeting last summer the use of the exhaust gas-heated hot spot was recommended as the best known means for dealing with present-day fuels. In order to determine the relative performance of an engine with and without the application of exhaust heat to the mixture, the technical department of Motor Age recently conducted a series of tests on a six-cylinder engine, first with and then without a hot spot of the replacement type.

The tests, which were made in the laboratory of Lewis Institute, Chicago, emphasized the points made at the S. A. E. summer meeting, and among the benefits derived may be noted the following:

- 1.—Crankcase dilution is greatly reduced.
- 2.—More stable operation under load at low speed is secured.

*Technical Editor, Motor Age.



1—Irrregularities on the side of the vertical section are rings of fuel slowly creeping up. 2—View taken 36 s. later. Manifold clear of all accumulations of fuel. Engine operating at 500 r.p.m. with heat on hot spot. 3—Heat turned off from hot spot. The fuel was colored red so as to show clearer in the photos. The engine is rapidly accelerating and the spiral motion of the fuel is clearly seen. 4—The spiral emerging from the hot spot is caused by the spirally shaped fins within the aluminum casting. Engine is running at a constant speed

3.—Greater fuel economy is obtained between limits.

4.—Manifold loading is eliminated.

The engine used was of the overhead valve type having six ($3\frac{1}{8} \times 4\frac{1}{4}$ -in.) cylinders. It would ordinarily be classified as a high speed type. The engine was fitted with a Stromberg model L-2 carbureter of the plain tube type having a 1-in. connection. The dynamometer employed was of the electric cradle type, the field coils being separately excited. Engine and dynamometer were connected through a short shaft which was fitted with Thermoid-Hardy flexible disk joints. The output of the generator was absorbed in a resistance panel with nichrome wire resistances so divided up that any load from nothing to overload could be applied.

For measuring the fuel consumption, use was made of the syphon device with a few modifications to obviate troubles from the accumulation of bubbles in the fuel line. The syphon principle has been shown to be capable of giving very accurate results in the measurement of fuel, but it is sometimes unreliable on account of air bubbles accumulating in the line. However, when the syphon flow is first passed to a gravity tank and from there to the carbureter, the method becomes very reliable. For the benefit of those who have experienced this kind of trouble, an illustration of the gravity tank arrangement is shown herewith.

Another interesting development resulting from the test was the engine cooling system. In making a dynamometer test road conditions frequently are not as closely approximated as might be desired, but by using an auxiliary cooling system of the type to be described, it becomes possible to duplicate any conditions. Inasmuch as the engine was of the thermo-syphon type, insufficient circulation was provided, and means had to be employed to augment the flow, for the cooling fan was not used.

Two auxiliary systems were provided, one to aid circulation through the engine and the other to increase the cooling capacity of the 60-gal. tank. To increase the circulation an injector was used. This consisted of a small nozzle through which water was forced under high pressure. The nozzle, which was $\frac{3}{32}$ in. in diameter, was connected to the water inlet of the engine jacket. A small amount of water was introduced by this means and high pressure behind the stream greatly increased the circulation. It was found that, although a good circulation was induced by the injector, the radiation area provided by the tank was insufficient to dissipate the heat.

Therefore, connection from a hydrant was made to the lower end of the tank, and water was drawn off at the

top, where an air vent was also provided. By this means the temperature could be very closely regulated at any desired point; in fact, it was possible to maintain the temperature to within one-half degree.

A spacer was provided between the engine and the carburetor block, which permitted of the insertion of a thermometer in the gas passage. It is realized that, because of the wetness of the mixture, thermometer readings in the intake manifold are not as accurate as they might be; nevertheless, they give a fair idea as to the effect of intake gas temperature on engine operation. The engine revolutions were measured with a speed counter and the operating speed was accurately maintained by two tachometers checking each other.

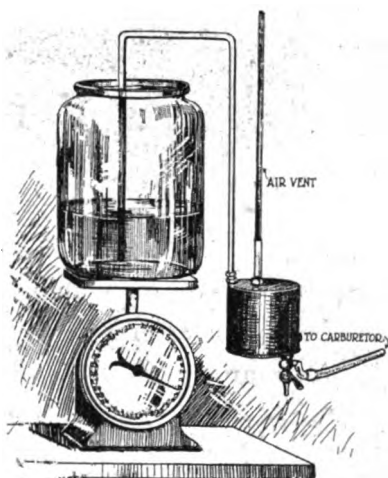
To the output in watts computed from the volt and ampere readings was added the loss in the dynamo. This is composed of two items, namely, the friction loss and the I²R loss.

Authorities are agreed that the greatest benefits from a hot spot are derived at low speed, and since this was borne out during the test before 1250 r.p.m. had been reached, the maximum horsepower was not aimed at.

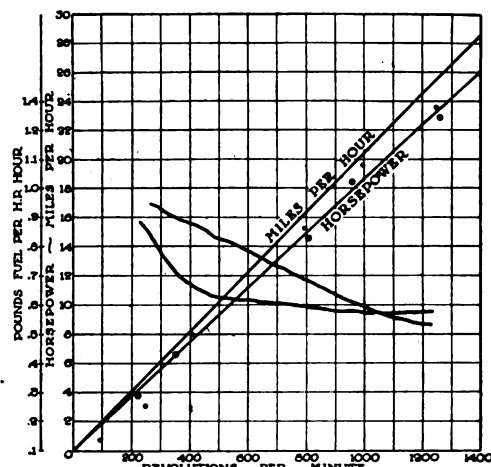
The second part of the test was conducted under average road conditions, to determine the exact benefit from the use of the hot spot with regard to crankcase dilution. A six-cylinder car in fairly good condition was used for the experiment. To afford a visible demonstration of the effects, this car was fitted with a glass manifold, of which a number of photographs were taken.

The first dynamometer test was made without the hot spot, the engine lying in the exact condition as sent out by the manufacturer. The carburetor was adjusted to as lean a mixture as could be burned without causing back-firing. In fact, the mixture was made so lean that the engine backfired constantly on retarded spark and while it was cool, the trouble being overcome only when the engine was warmed up and running on advanced spark.

In specifications of engine tests it is ordinarily stipulated that the duration of the run shall be at least five minutes. For the purpose of greater accuracy the tests on this engine was made to cover 15 minute periods, except runs at higher speed, these being of ten minutes' duration. Table 1 gives the results of the first test run without the hot spot, at 250 r.p.m. Practically three hours were spent in obtaining a satisfactory test at this



Arrangement of fuel weighing apparatus and syphonic feed. Horsepower and fuel consumption curves with and without hot spot



low speed, and the carburetor choke valve had to be closed in order to get the engine to perform at all.

In each case the difference between the two fuel weight readings was taken to give the fuel consumed. This figure, divided by the horsepower produced and multiplied by the time factor, gives the consumption of fuel, in pounds per horsepower hour.

The test with the hot spot was made under the same conditions as without the hot spot. With the hot spot installed on the engine it was found that the same operation could be secured with a leaner mixture at low speed. Much better idling was secured from the engine with the hot spot in place. After the engine had been brought to the proper temperature it was immediately placed under load at wide open throttle, running at 100 r.p.m.

The data obtained, when presented in graphic form, shows very strikingly the benefits of the hot spot. It was anticipated that there would be no increase in horsepower with the hot spot. A falling off in power might be expected, as a result of the expansion of the air and the reduced volumetric efficiency consequent thereto; however, no difference in the horsepower curve was noticed, except that the more stable engine operation with the hot spot made the readings lie closer to the curve. A great difference is shown in the fuel consumption between low speed and 1060 r.p.m. The upper fuel curve gives the data from the test without the hot spot and the lower with. The best results from the hot spot, as far as economy is concerned, were obtained at 450 r.p.m. where the saving amounted to 24 per cent.

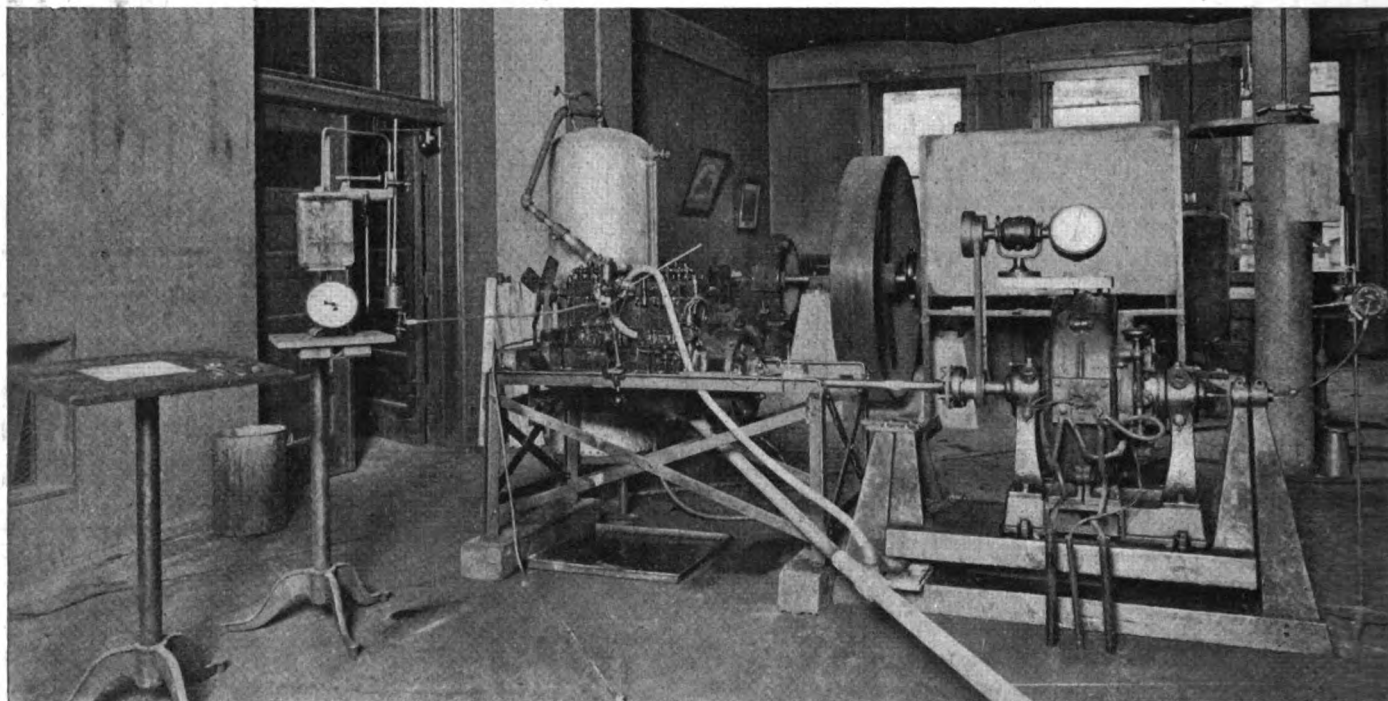
TEST WITHOUT HOT SPOT

Test No.	Duration of Run, Min.	R.P.M.	Volts	Amps.	Watts	Loss in Dynamo	Actual Watts	Engine Horsepower	Water outlet Temp.	Intake Gas Temp.	Fuel Consumed	Fuel per Horsepower-Hour, Lb.
L	15	250	37	44	1628	537.5	2165.5	2.9	178	114	.704	0.971*
2	15	409	47	102	4794	1172	5966	7.98	178	125	1.79	0.895
3	15	633	57	107	6109	1627	7736	10.34	182	126	1.96	0.759
4	15	800	78	118	9210	2036.5	11246.5	15.07	180	98	2.61	0.693
5	15	1000	112	110	12310	2343	14663	19.63	182	100	2.97	0.605
6	10	1250	126	111	13960	2813	16773	22.46	185	104	2.125	0.567

TEST WITH HOT SPOT

L	20	100	9	25	225	205	430	.577	130	120	.469	2.44
2	15	114	10	37.5	375	267	642	.861	182	148	.2815	1.306
3	15	240	23	89	2047	757	2804	3.761	182	160	.847	0.9
4	15	349	33	105	3465	1089	4654	6.25	182	160	1.1095	0.706
5	20	503	51	107	5460	1398	6858	9.19	184	162	1.496	0.653
6	15	626	65	104	6760	1593	8353	11.20	180	158	1.685	0.602
7	15	806	84	105	8825	1932	10757	14.42	178	144	2.160	0.582
8	15	970	105	108	11350	2761	13617	18.29	180	146	2.74	0.601
9	10	1260	138	103	14214	2764	16978	22.75	182	144	2.22	0.585

*Hot air valve had to be closed; 250 r.p.m. lowest possible speed.



General set up of test, showing fuel tank on scale, cooling tank, engine and dynamometer

On the basis of a gear ratio of $4\frac{1}{2}$ to 1 and the use of 32-in. tires, there is a fuel saving as a result of the use of the hot spot up to approximately 25 miles per hour.

In the second test, made on a six-cylinder car, the main object was to determine the effect of the hot spot on crankcase dilution. Many experiments have shown that the oil loses some of its lubricating properties before the car has covered the first 100 miles. Examination of numerous reports by a large oil company show that the lubricating oil in the crankcase after approximately 100 miles running reaches a point of equilibrium, where the inflow of fuel from piston leakage is offset by the evaporation through the breather. From this it was concluded that a two-hour idling test at 500 r.p.m. would give a fair insight into the dilution factor. Accordingly, the engine was supplied with a good grade of Pennsylvania, paraffin base oil and run for two hours at 500 r.p.m. without the hot spot. Then a quart of oil was drawn off, the crankcase drained and flushed and thor-

oughly cleaned. The test was then repeated after fresh oil had been put in and the hot spot applied. The oil was tested by the chemical department of the Sinclair Refining Co., and the report is as follows:

ANALYSIS OF CRANKCASE OIL USED IN TEST

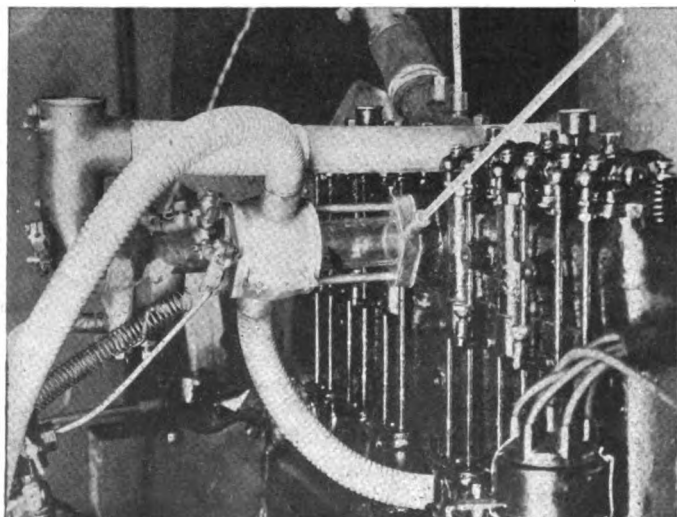
Without Hot Spot		With Hot Spot
Gravity	30.3	30.1
Flash	265	330
Fire	465	460
Pour	40	45
Color	Cloudy N. P. A.	Cloudy N. P. A.
Viscosity		
At 100° F.....	217	256
At 130° F.....	116	131
At 210° F.....	49	51
Conradson		
Carbon .....	.29%	.22%
Emulsion	Poor	Poor
Acid Value .....	.28	.18
Ash	Trace	Trace
Sed. by wgt.	Trace	Trace
Sed. by vol.	Trace	
Dilution at 600° F.....	5%	4%

ANALYSIS OF FUEL USED

Gravity	56.4	Initial	108.
Color	Plus 23	At 221°	24.0
Doctor		At 284°	50.0
With Sulphur N. G.		At 374°	85.0
Odor	N. G.	End	430
Heat	31 degrees	Loss	2.0%

The analysis of the gasoline shows sample fairly representative of the gasoline now being marketed.

Some very satisfactory results were obtained from the glass manifold, which was made up by the Corning Glass Works specially for this test. A number of photographs were taken, which showed the effect of heat application to the mixture. Without the heat applied to the hot spot, the manifold was very prone to "load." Heavy puddles of fuel were noted at the inside turns of all bends. The

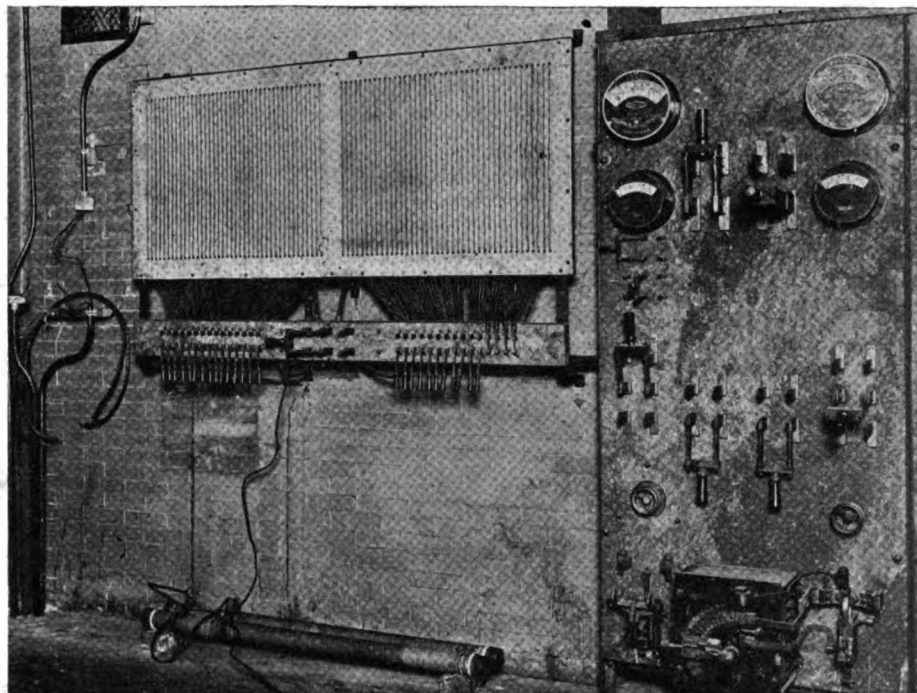


View showing carbureter, hot spot, glass manifold and flanged insert for holding thermometer

walls of the riser of the T were covered with raw fuel, which traveled slowly upward until the T section was reached. Here the puddles would increase in size and a moment later a large portion of the puddle would break away from the mass and, becoming free, would enter the engine.

These were the moments when faltering of the engine was noticed, and the entrance of this unvaporized fuel is probably the reason for the spasmodic operation during "loading." When the heat was applied to the hot spot this tendency to "load" was immediately reduced. In 36 seconds time after the heat was turned on the manifold was practically dry and the only noticeable factor that would lead one to believe that any fuel at all was passing through was a slight film that seemed to be creeping along the surface of the glass. No puddles or accumulations were present. This seems to substantiate the assertion that proper manifold design is even a larger factor in achieving fuel economy than is a volumetrically correctly proportioned mixture.

The hot spot itself is of aluminum, having a pressed steel housing surrounding it, through which the exhaust gases are caused to surge. The internal passage for the mixture is so made that there is no wire drawing at any place. The gases are intercepted by the spiral vanes inside the hot spot, which give a whirling motion to the mixture, as well illustrated by the photograph which



Resistance board and control panel which serve to absorb and control the electrical energy produced

shows a streak of mixture emerging from the hot spot.

The gases in the exhaust manifold can be regulated to take either of two passages with the hook-up from this hot spot. Either the entire volume of exhaust gas can pass through the hot spot or the hot spot passage can be closed, in which event the gases will pass directly out of the exhaust manifold.

Motor Boat Equipment for a Seaplane

THE question has arisen many times during the past year or two as to the status of seaplanes or flying boats. Since these craft must run upon the surface of the water a considerable part of the time, some of the officials of the Bureau of Navigation have raised the question as to the necessity of equipping seaplanes with the articles required by law for motor boats of the smaller classes, says *Motor Boat*.

Recently a supervising inspector of the Steamboat Inspection Service, Bureau of Navigation, stationed at Louisville, Ky., ruled that seaplanes must carry the equipment required on motor boats. This would mean that a seaplane must carry the proper lights, a bell, a whistle, life preservers sufficient to sustain afloat all on board, a fire extinguisher and two copies of the Pilot Rules. As a matter of fact this equipment would place no hardship upon the seaplane, for the life preservers might be in the shape of life preserver cushions for the seats, the bell could be installed without difficulty, and as to the lights, ultimately all aircraft must carry lights following very closely marine practice. The copies of the Pilot Rules, while not essential perhaps, contain the rules of the roads and other regulations which must be followed by any seaplane while running on the surface of the water. It is obvious, however, that the whistle would be of little use. While other craft might hear the whistle of a seaplane, it is certain that the navigator of a seaplane would not be able to hear sound signals from other vessels.

In order to obtain an official opinion on the subject *Motor Boat* asked Commissioner of Navigation E. T. Chamberlain of Washington for an opinion, which is ex-

pressed in the following letter from Mr. Chamberlain:

"I have received your letter of the 25th instant inclosing a clipping from the Louisville (Ky.) *Times* of Aug. 18 in connection with the question whether seaplanes which operate upon the surface of the water a considerable part of the time should be considered motor boats while so navigating.

"The question is one which has troubled the Bureau for some time. The Solicitor of this department has held that such seaplanes are motor boats within the meaning of the law and are required to have the equipment provided by the Act of June 9, 1910. While the Bureau has not questioned that decision, it has not pressed the matter, as undoubtedly these planes are primarily intended for air rather than water navigation, and there is considerable doubt as to the carrying of the equipment adding to the safety of those on board. Of course, while these planes are in the water they should comply with the rules of the road, with the possible exceptions of passing signals, which for obvious reasons could not be heard.

"I think you will appreciate the difficulties of the case. I have endeavored to bring the matter to a court decision but so far without success."

Respectfully, E. T. CHAMBERLAIN, Commissioner.

It is apparent that the problem is one which has troubled the Bureau for some time and also that the Solicitor of the Bureau holds that seaplanes are motor boats. Evidently the Bureau of Navigation is trying to get the matter settled definitely and satisfactorily by bringing it to a court decision but has been unsuccessful in obtaining this.

Sales School Develops Permanent Business Builders

Since effective merchandising methods have become of vital importance, special interest attaches to the development of good salesmen. Training courses for salesmen are being given in some places to fill this need. A course which trains a few high-grade men intensively is described here.

By Norman G. Shidle

THE idea is becoming common among manufacturers that their salesmen can render the most effective service only if they understand the spirit and ideals of the company for which they work as well as the technical details of the product which they are marketing. Such men have a broad vision of their task and an intelligent conception of really effective business building. They are likely to do more for the firm than sell cars; they carry on their selling activities in such a way as to build permanent business and increasing goodwill for the organization. And they often form a fertile field from which to draw future executives.

It is this conception of permanent business building that has been responsible to a large extent for the establishment of sales training courses by a number of manufacturers. Since the widespread application of the training idea is comparatively recent, few standards of practice have yet been developed. The courses vary widely in method and some have been more successful than others. It was suggested to AUTOMOTIVE INDUSTRIES some time ago that an association be formed of those firms conducting sales schools, similar in form to the National Association of Corporation Schools, but less extensive in scope; the purpose of the organization to be the exchange of experiences, the determination of the best methods of conducting such courses, and the general promotion of more effective use of the sales school idea.

Whether or not such a plan would be feasible, it is certain the knowledge of the practice in other organizations is likely to be of value in conducting a course in any particular instance. For this reason the details of several successful training courses for salesmen will be presented in AUTOMOTIVE INDUSTRIES. Much valuable information can thus be brought out concerning general methods of procedure as well as concerning specific practices which might profitably be adapted elsewhere. The present article deals with the course conducted by the Nordyke & Marmon company for their automobile salesmen.

Small Number of Carefully Selected Men Trained

The chief characteristics of this particular course may be listed as follows:

1. It trains a small number of men.
2. These men are very carefully selected and in practically every case have exceptional qualifications to begin with, both as to education and personality.
3. The training is very thorough, covering a period of six months' intensive work.

Such a course prepares the ground work for a strong organization in the future and produces each year a few

strong men for immediate work. It does not provide a large number of men for immediate service in the field. It looks rather toward obtaining the proper men in the beginning and training them for permanent service with the company.

One class begins every six months, usually in April and September. Each class comprises five members. The selection of the men is very carefully made. Previous employment with the Marmon organization is not a requirement, but men in the dealer or distributor organization may take the training provided they are selected. No definite set of requirements has been written out, but certain qualities are always required. The past history of the applicant is carefully investigated. He must have a pleasant personality and all of the other qualifications which are necessary to any salesman. In addition he must have an excellent education. Thus far nearly every man to be admitted to the course has been a college graduate, and although a college education has not been made a strict requirement, a man needs an equivalent preparation to fully meet the demands of the training.

Actual Shop Work Performed by Students

When the men have been chosen they come to the Marmon factory, where the entire course of training is conducted. Thorough instruction is given along four main lines:

- | | |
|-------------------------|------------------|
| 1. The product. | 3. The buyer. |
| 2. Selling the product. | 4. The salesman. |

A large part of the time is spent in becoming thoroughly familiar with the product. This is accomplished by actual shop work on the part of the student. Each student goes into the shop and works as an ordinary member of the operating force. He remains in each department until he is capable of performing the work of that unit satisfactorily.

He works for a time in each of the sub-assembly departments and before he is through must be able to make each of the sub-assemblies. Later he is moved to the final motor assembly department and works there until he can perform the various operations efficiently. He spends some time as well in the heat-treating and motor-testing departments and learns the details of their operation.

A reading and recitation course on gas-engine design is given which must be passed by each of the students. Another lecture course takes up the theory of salesmanship.

This theoretical knowledge of selling, which is pre-

sented in an abstract way, is supplemented by practical experience in selling. These students are sent out to automobile shows and there gain concrete experience in meeting customers and attempting to sell cars. They were used recently with excellent results both to students and dealers in the National Demonstration Week held during October.

The mechanical phases of the product covered by the student may be summed up briefly as follows:

- | | |
|-----------------------|---------------------------|
| 1. Design. | C. Frame. |
| A. Powerplant. | D. Body. |
| a. Engine. | a. Interior. |
| b. Electrical system. | b. Exterior. |
| c. Carburetion. | 2. Construction. |
| d. Cooling system. | A. Manufacturing methods. |
| e. Lubrication. | B. Inspection. |
| B. Running gear. | 3. Operation. |
| a. Transmission. | A. Performance. |
| b. Rear system. | B. Upkeep. |
| c. Front system. | |

A nominal salary of \$100 a month is paid to the students while they are taking the course. If a man completes the course successfully, however, a good position is awaiting him.

A general outline of the course shows that many features of the product are discussed besides the mechanical phases. Among the esthetic features of the product discussed are riding qualities, interior finish, exterior finish, body lines, social position in automobile society.

All Details of the Organization Are Discussed

The policies of the company, its ideals, its methods and its history are all fully discussed. They learn concerning the company, its age, financial rating, size as regards both employees, buildings and equipment, organization and reputation. This gives them a thorough knowledge of all departments of the business, broadens their vision and makes them potential executive material. Throughout the course the students have the opportunity for personal contact with the executives of the company, and in this way become familiar with the actual practice and methods used in the organization. And in like manner, the executives get an opportunity to know these new men, to estimate their ability and possibilities with the company.

A thorough drilling in all phases of sales work is given. In the outline for instruction in this connection appear the following subjects:

- | | |
|------------------------------|--------------------------------------|
| 1. Advertising. | B. Handling objections. |
| A. Policy. | a. Feigned. |
| B. Relation to selling. | b. Real. |
| C. Purpose. | 5. Satisfying reason. |
| D. Mediums. | A. Closing the sale. |
| E. Psychology. | a. Signing the contract. |
| 2. Developing prospect list. | B. Buying motives. |
| A. Primary list. | a. Sales arguments. |
| B. Secondary list. | b. Selling strategy. |
| 3. Setting interviews. | 6. Selling service. |
| A. Home. | A. Buying used cars. |
| B. Office. | B. Creating good will. |
| C. Clubs. | a. Making a booster. |
| 4. Creating desire. | b. Beginning to sell the second car. |
| A. Developing interest. | |
| a. The demonstration. | |

The student is taught in a sensible and general way how to analyze the prospective purchaser to whom he is selling a car. He is taught to consider both the financial and social status of his prospect, together with the latter's taste or attitude of mind. Some men are discriminating, some mechanical, some beauty lovers, etc. The student is shown the best way to sell to each of the various types.

That the student may analyze himself sufficiently to know whether he comes up to the standards set for being a good salesman, the various desirable qualities of such a salesman are discussed. Under this head the following qualities come in for attention:

1. Instinctive fitness.
2. Scientific training.
3. Care of health.
4. Appearance; cleanliness and dress.
5. Deportment; courtesy, tact, adaptability, optimism.
6. Initiative.
7. Persistence.
8. Honesty.
9. Knowledge of car.
10. Knowledge of psychology.
11. Conversational power.
12. Good manners.
13. Salesroom ethics.
14. Knowledge of outside factors which affect car sales.
 - a. Current and future business conditions.
 - b. Stock exchange.
 - c. Commercial reports.
 - d. Society doings.
 - e. Inheritances.

From this outline it is apparent that a very wide knowledge of current events, as well as of selling principles, is necessary for the man who is to attain a high place in the selling field. Through such a course as has been described, the new salesman is made aware of all the things he should know and is actually taught a great many of them. And not the least among the things gained from the course is a conception of the spirit of the organization; its tradition, its history, its organization, and its ideals. If these things can be imbued into the new man, he will be able to do the most effective work possible for the company. How effective that work will actually be is dependent, of course, entirely upon the essential goodness of the tradition, organizations, and ideals which the company has to imbue him with. In some cases these are very good; such companies are capable of turning out good salesmen—and good men. In other instances, this is not possible. The success of any such training course and of the men turned out by it will always depend largely upon the fundamentals of the organization which is conducting the course.

An Aid to Battery Service

BATTERY Service Manual by Donald D. Blanchard; U. P. C. Book Co., New York. The satisfactory operation of the automobile depends to such a considerable extent on the condition of the storage battery that the provision of service facilities for it has become a matter of prime importance. In this book, which is a reprint of a series of articles that appeared last spring in *Motor World*, the battery service problem is treated in simple, non-technical language exclusively from the practical standpoint.

The text matter is based primarily on information secured during visits to a large number of service stations. The methods described are in current use. Consequently this manual is of unusual practical value.

The Storage Battery Trouble Chart, reprinted for wall mounting, is furnished as a supplement to the book. The first chapter deals with battery troubles and following this come chapters on the test for and location of these troubles. The subject of battery charging is then discussed. Battery repairs are taken up next and general methods and the use of tools and special equipment are discussed. The next chapter is on service station layout and the final section treats of management.

Selling Spare Parts with Export Cars

Much to our surprise we learned the other day that some exporters are sending initial orders of cars to foreign countries without spare parts. Could anything be more disastrous? This article describes an incident and quotes a few opinions of a Finnish importer on the subject.

By Clyde Jennings

EXPORT trade in manufactured articles is a comparatively new development in this country, and especially is it a new line of thought and activity for a good many of the automotive manufacturers. Some of the old world countries have exported automotive vehicles for a number of years, but their experience is not of great value to American firms, because of differences in unit products and because of the number of units involved in plans.

The American manufacturer will not be interested in export trade unless he can sell in greater numbers than has the European manufacturer. The American manufacture (and consequently the sales methods) is built on the quantity idea. The American is looking to the export territory with a view of possible consumption, under the proper encouragement, not with a view of how many cars he can ship on immediate orders. The American naturally compares the population of the foreign country with that of this country and he will not be entirely content until the automobile population is at a comparable percentage. Of course this will take time and a long educative campaign, but it well illustrates the point of view.

All of this is said to bring up a point that is entirely different. It is this:

While rushing into this great, but little understood, field of trade the American export trader has been, is, and will be for several years to come, a victim of many easy money seekers. Practically every automotive manufacturer has met men who are ready, for the proper consideration, to "put him right into the export business." The list of manufacturers who have paid these men real money would be a long one. It would not be so bad if the loss to the manufacturer was all there was to this experience, but the great loss to the prestige of the American automobile in general and certain automobiles in particular is far greater and of much more importance.

After bumping into several disastrous experiences of this kind a number of automotive manufacturers have established export agencies, or have signed long sales contracts with established export houses, which have automotive experience and which promise only a gradual development.

Still a Danger

But even at this stage the danger from the "easy money" adventurer is not past. He is still at large and is reaping a rich reward for his supposed knowledge and piling a heavy overhead on an industry that cannot afford it, when we consider the world-wide competition that it must meet, also that it is an "infant industry" as far as export trade is concerned.

Now we are getting to the real point of this article.

Recently there came into our office a man who wanted to sell to us certain ideas on export trade. The chief idea was printed in a book that cost, he said, in the neighborhood of \$50,000, and we do not doubt his word.

The book was a parts list, with the proper inventory of parts set forth for a dealer in Pernambuco who might have 1, 2, 4, 5, 25, 50, 75, 100, 125 and 150 cars in service. This was beautifully printed and was an intricate bit of printers' work. It looked more like a railroad tariff sheet than anything else we can think of. The idea was excellent, it was well carried out except that we think there was an immense unnecessary labor in filling so many columns.

This company sells abroad several models of cars and trucks, so this was quite a large book, of necessity. The first bad feature of it was that about 18 pages of text were taken for the introduction, and it is necessary to read all of the introduction to understand the arrangement in the columns. Often a single word or figure at the head of the column would have made it perfectly plain, but this was omitted. Apparently this was done to make use for the introduction. The compiler appeared to think it was quite necessary to have the introduction acquire importance.

But the amazing part of this book was a cable code that occupied a number of pages. As the compiler explained, this was arranged so that the dealer in Pernambuco could order the parts for 125 cars with the use of a five letter word.

Cars Without Parts

Here is where a difference of opinion arose that in turn ended the interview. The following dialogue will explain:

Question—Do you mean to say seriously that this company will sell to a dealer in Pernambuco, or any other place, 125 cars and not require him to buy a stock of parts?

Answer—Why, certainly. All exporters do business that way.

Question—What happens as to parts when a dealer orders 125 cars?

Answer—The service or parts department is told that this man is a prospect for the purchase of parts on this list.

Question—Do you mean to tell me that any dealer ever ordered cars from this company and later cabled for a full list of parts?

Answer—Why, certainly. Such orders are coming in almost every day.

Question—Now, honestly, man to man, do you really mean to tell me that this company will sell a large number of cars to go to a dealer thousands of miles away from the factory and not exact an order for parts?

Answer—Why, certainly, I am honest in telling you that. They could not sell cars if they insisted on the parts.

Then he named five automotive export companies that he said followed this custom. As to four of them, the writer had no knowledge; but the fifth, he knew it would not sell a dealer cars without a parts order attached, and he said so. So the visitor said he was not certain as to that company. Then we closed the conversation.

As testing this statement that all exporters did business in this way, we called up an old-time exporting house that has been quite successful in selling a complete line of cars and trucks in many parts of the world. This company has a parts list similar to this \$50,000 one as to information, only it did not cost anything like that amount. It is made on a typewriter, mimeographed, and can be changed overnight, if required. It is kept up to date without printers' bills and is so cheap that it can be placed in hands of every one concerned without raising the overhead. This firm was asked if a parts order was required with an order for vehicles. The answer is interesting in itself. It is like this:

"We do not exactly require a parts order with the order for vehicles. A good many foreign business men do not like to be required to do anything. We handle this question as diplomatically as possible, but it has been a long time since we exported an initial order of vehicles without the proper number of parts going with them."

The firm mentioned by the \$50,000 book man to which we objected has a positive policy. This firm does not sell abroad except to dealers. It does not accept as a dealer any business man or firm that is not willing to undertake the service end of the business and to order the proper number of parts. In fact, the parts order is automatically attached to any order for vehicles.

This whole proposition seems so very primary to the writer that he was very hard to convince that any firm would even consider an export order without providing for parts and service, but it appears that some companies do this very thing and then lose heavily by reputation because they follow this practice. There certainly is no one thing that will as quickly destroy the prospect of selling a car in a foreign country as getting a lot of cars into that country and then not having them run.

Any dealer in this country will tell you that it is impossible to take 125 cars of any make and expect them all to go into service and stay in service even a limited time without service and parts.

There have been some curious efforts at export trade. Recently a letter came into this office from a truck manufacturer that read something like this:

"We are not much interested in export now. Some time back we did sell some trucks for export, but at present we are unable to find the record of to whom these trucks were sold, or to what country they were shipped."

As to this attitude, we can only hope that these trucks will not be "ghosts" for this company if it ever decides to go into exporting.

An Importer Speaks

We want you to read just a bit farther. This letter, received since this article was written, would appear to entirely sustain the position taken here:

J. E. Tuokkola, a dealer in American automotive goods at Helsinki, Finland, is the writer. From this letter we gather that Tuokkola is quite satisfied with the treat-

# 4		" " TRUCKS				
ITEMS	SYMBOL	NAME	1 CAR	5 CARS	10 CARS	15 CARS
105	1FM4	Tire holder strap		1	2	2
106	2HE281	Assembled windshield		1	2	2
107	1TF36	Radiator cap	1	3	4	5
108	R1RG116	Assembled lighting switch		1	2	2
109	1RG64	Key for lighting switch	1	3	5	8
110	3TG29	Assembled headlamp		1	2	3
111	3TG28	Assembled tail lamp		2	4	6
112	1RG13	Assembled ignition switch		1	2	3
113	1RG13A	Key for ignition switch	1	3	5	8
114	1PH7	Filler plug for gas tank		2	4	6
115	T1TJ1	Assembled starting crank	1	2	4	6
116	1RE15	Bushing for steering gear bracket		1	3	5
117	1ME3	Bushing for steering gear bracket		1	3	5
118	1PK9	Steering connecting rod		1	3	5
119	1PM10	Brake cable	1	2	3	4
120	X960	Assembled tool kit 1/8" straight nipple oiler		1	3	5
121	T122	Wrench center crank bearing		6	15	20
122	T105	Wrench crank end connecting rod	1	1	2	2
123	T101	Piston ring clamp	1	1	2	2

Itemized prices are purposely avoided because of fluctuation. Invoice will afford correct itemization and price lists will be furnished to dealers upon application.

A page of an easily made and effective export parts list

ment that he receives from the manufacturers he represents, but that he believes that he is having unfair competition from representatives of rival manufacturers.

He believes that this unfair competition is due to the fact that manufacturers have not been careful in the selection of their representatives and that the practices he objects to are not those of good business.

We will quote a few sentences from his letter, which are quite to the point:

"Your papers are strong enough to do us a material service. American manufacturers are, of course, looking for more business, which is well. But they should look longer into the future by being more careful as to the firms they select as their foreign representatives. Too many manufacturers are giving their lines into the hands of firms that cannot properly represent them. It merely means that the manufacturer is too anxious to sell a large number of cars. He does not look to future sales, when he does not look well into the service. Cars are coming here without spare parts. The knocked down parts are poorly assembled and the buyer becomes disgusted and gives to all American cars a "bad name." It ought to be forbidden to sell any cars to a foreign country without, at the same time, sending a sufficient quantity of spare parts. We must frankly state that European cars have to-day a better name here than American cars, chiefly because the American cars have not been handled properly.

"We might add that all American cars are not suitable for Finland. Our roads are rough and hilly and cars to be sold here must be built for these conditions."

A SERIES of lectures on Internal Combustion Engines and Tractors by Oliver B. Zimmerman of the engineering staff of International Harvester Co. has been reprinted in pamphlet form. It constitutes an elementary textbook on farm tractors and is exceptionally well written. The book covers the development, design, construction, function and maintenance and should be a very helpful guide to any one wishing to acquire a knowledge of the fundamentals of tractor construction, operation and maintenance. There are numerous illustrations accompanying the text.

Austrian Industry Slowly Gaining in Production

Factories were greatly developed during the war and are in position to produce large numbers of vehicles when fuel is available. Three plants now producing and some cars have been exported. One factory plans for 25,000 cars a year. Used cars brought high prices at sale.

By Benno R. Dierfeld*

IN spite of the constantly increasing difficulties, considerable activity is already being developed in the different Austrian automobile factories, the output of which was increased materially during the war. As the demands of the Army were similar in many respects to those of peace time, the increased production has been maintained since the war came to an end. All of the factories are overwhelmed with orders and new vehicles are in great demand, despite the fact that deliveries can be made only after long intervals—that is, of course, only where domestic purchasers are concerned.

All price quotations are only of momentary value, and orders are received without the price being fixed, the purchaser engaging himself to pay any reasonable price the factory demands at the time of delivery. For instance, in July, 1920, the price of a new 20 hp. passenger car chassis was about 210,000 crowns (\$1200 at the current exchange rate of the crown). The pre-war value of a crown was 20c., but at the present time the prices are considerably higher. As the exchange value of the dollar has since risen, this increase in price is of little consequence to the American or English purchaser.

A regular clearance sale of used cars took place in Vienna some time ago, at which seemingly fabulous prices were obtained—from 300,000 crowns for a light car up to 1,500,000 crowns for a luxurious Rolls-Royce 1914 model. (One dollar was equal to 200 crowns at that time.)

The buyers were either Italians or members of the Entente commissions. In this way, of course, a great many good cars were withdrawn from service in Vienna, but this was not at all regretted by the Austrian automobile industry, for a new opening for their product was thus created. Moreover, with the existing shortage of fuel, a lessening of the number of cars in service is not entirely detrimental.

Some information on the activities of individual automobile factories in Austria may be of interest. The plant of the Austro-Fiat Co. at Vienna-Florisdorf (now more intimately associated with the principal factory at Turin than before the war) has been considerably enlarged and now is devoting itself to a more extensive line than previous to the war. The only car on which deliveries are now being made is a 38 hp. passenger car with generator lighting and cantilever rear springs, but a smaller machine with a 24 hp. rating will be brought out in the near future. These models embody the well known features of the Italian Fiat.

A 4-ton chain driven truck (a former military subsidy type) is also produced, as is a light truck of 2-ton capacity.

*Automobile authority and writer of Berlin.

The line further includes the Excelsior motor plow, stationary internal combustion engine, engines for motor ships and the well known Hiero airplane engine.

The Puch works at Graz, Styria, are building only a large passenger car of 38 hp. rating, which is the same model as turned out in 1914 and during the war. This car is called the Alpine type, because in 1914 it won the first prize in the Alpine Endurance Contest. In its general appearance it is similar to the standard German cars, having V type radiator, a streamline body with horizontal top edge, disappearing top, and a two colored body finish. A smaller model will soon be added. Another product of the Puch works consists of narrow gage railways, with internal combustion engine locomotives. These railways were first built for Army purposes, but are now extensively used in agriculture, forestry and mines, owing to the lack of horses and other draught animals.

The Austro-Daimler works at Vienna, which during the war produced the well known Austro-Daimler aircraft engine, motor cars of all kinds and heavy gas tractors, are chiefly occupied in transforming these war vehicles to render them suitable for peace-time purposes. A 30 hp. passenger car, known as the Alpine type, is also being manufactured, and already has been turned out in great numbers for shipment to foreign countries. A 6-cylinder passenger car is being developed for regular production in 1921. Negotiations for the amalgamation of the works of the Austro-Fiat, Puch and Austro-Daimler were begun last spring, but so far have not led to any definite results.

A newcomer in the Austrian automobile industry is the large Oesterreichische Waffenfabriksgesellschaft (Austrian Arms Mfg. Co.) at Steyr, favorably known because of its production of the Männlicher carbines, Schwarzlose machine guns, etc. This firm, with its personnel of high-class mechanics and its extensive experience in the technique of metal work is preparing to become a sort of Austrian F. N. At present it produces a 6-cylinder, 30 hp. with cylinder dimensions of 80 x 110 mm. Among the features of these vehicles are a ball bearing crankshaft, disk clutch and centrally mounted change speed lever. Both sets of brakes operate on the rear wheels. Half elliptic springs are fitted in the front.

Another model that will soon be put in production is a light-two-seater car with 18 hp. four-cylinder engine of 75 mm. bore and 100 mm. stroke. A truck with 6-cylinder engine and worm drive is being produced. A production of 25,000 cars per year is figured on, but the materialization of these plans will depend upon the ability to obtain sufficient coal.

At present negotiations are pending looking toward the leasing of the works to a British syndicate.

The Automobile Should Be Major Factor in Highway Traffic

This article, based on recent count of actual traffic in Manhattan, is a plea that legislation be directed toward making traffic safe for the vehicle, not the vehicle safe for other traffic. The automobile has become such a factor that it cannot merely be relegated; constructive effort is necessary.

SOME day, so say those who have made a study of the transportation problems of the country, the highway system will be not at all like that we have to-day; neither will the rules and regulations governing the operation of motor vehicles be those which municipalities and States, from time to time, put upon the statute books.

When the inventor and engineer gave the motor car to civilization, they presented a piece of machinery of which the primary service was speed—a small unit of rapid travel from place to place. Since the coming of the motor car, business and the life of the nation have been greatly speeded up, and the possibilities in this direction are beyond conception, provided the country fits itself to accommodate the product of the inventor and engineer.

Speed is inherent in the motor vehicle, as is realized by any one who has ever driven one. It is difficult to operate a motor vehicle at a slow speed. One may drive for a while at 15 or 18 miles an hour, but almost unconsciously the foot presses down a bit on the throttle and the vehicle seems to travel most conveniently at 25 or 30 miles an hour.

Twenty-five or thirty miles an hour is a perfectly safe speed so far as the vehicle is concerned but it is not safe for the other occupants of the street in cities where the congestion is great. Because of the fatalities and damage done by the rapidity of movement of motor vehicles, the present effort of lawmakers is to lessen the speed of the automobile and motor truck. An analysis of the proposition, however, reveals that the proper plan of attack would be to make the city safe for the vehicle, rather than to work solely to make the vehicle safe for the city.

When a high-speed machine of large productivity is put in operation in a factory, the management makes an effort to get the highest possible speed and the greatest production out of the machine. Methods of a similar nature should be applied to the operation of motor vehicles. Instead of endeavoring to decrease the speed of this modern piece of machinery, the effort of the nation, and its component parts, should be to provide means whereby motor vehicles may travel at somewhere near their maximum safe speed.

Despite the restrictions put upon the operations by legislatures and conditions of the present day, it is interesting to note, nevertheless, the extent to which the use of vehicles is increasing, particularly in the large metropolitan district surrounding New York. Statistics recently have been gathered by the National Automobile Chamber of Commerce, and various bureaus of the City of New York, showing the vehicular transportation between Manhattan Island and the outlying territories.

It is interesting to note that between May 30 and Sept. 15 of the present year the average daily passenger transportation of the Long Island Railroad into New York in the morning and out again in the evening totalled 275,936

passengers. If these people were carried in five-passenger motor cars, loaded to capacity, they could have been transported in 54,187 automobiles. More than half this number of automobiles passes between Long Island and Manhattan Island daily, over the Manhattan and Queensboro bridges, which are only two of the many bridges connecting Manhattan Island with its suburban districts.

A count by the National Automobile Chamber of Commerce made recently showed that 155,700 cars and trucks travel between Manhattan and the suburbs every day, and this despite the very bad conditions which prevail, so far as motor-car operation is concerned.

Driving a motor vehicle in lower New York City, below Forty-second Street, is not a pleasure in any way because of the congested condition of the streets, the slow speed necessary, the many traffic hold-ups.

Those who have studied the situation have predicted that some day there will be overhead thoroughfares, going up and down town in Manhattan Island, also going crosstown at various places, on which vehicular traffic could move at good speed without endangering pedestrians.

It is a subject for mirth to-day when one narrates the early efforts of authorities to make the locomotive safe for the streets. Men with bells were even compelled to run ahead of trains to warn the public. But is that situation much different from that which prevails to-day, when authorities concern themselves mostly with speed reductions rather than means for making speed safe?

Had the original idea concerning the locomotive prevailed it would not be possible to-day to travel from New York to Chicago in 20 hours. But the idea did not prevail, and to-day fast trains run under and over our great cities with safety. Railway agitation to-day properly concerns itself with the elimination of grade crossings and such matters, which is the form of agitation that would be beneficial to motor vehicular development.

The railways even have their yards—such as are necessary—underground or elevated in many instances.

To-day New York City is almost entirely devoid of parking facilities. Many of the streets are narrow, and the driver who takes a chance and parks his car on many streets, leaves a spotless vehicle open to damage by the many motor trucks which throng the narrow thoroughfares.

Despite these conditions, as previously stated, the motor vehicle transportation between Manhattan Island and the suburbs daily is enormous and growing every year, and may be taken as an indication of the pressing necessity for an improvement in the transportation of the city.

The same applies to other cities, and interesting data could be developed by counters along various main thoroughfares, ascertaining the extent to which the motor vehicle binds the city to the surrounding territory.

In 1917 the Long Island Railroad carried 5,912,833 tons of freight and hopes this year to carry 6,250,000 tons. Say two-thirds of this was l.c.l. freight, which enthusiasts for truck use expect to see carried in trucks some day, it would mean 966,800 truck loads or 3223 truck loads for each of the 300 working days of the year. This is not a high figure, it merely means the raising of the number of vehicles which cross two of the bridges from 155,700 to 158,923 if they made the trip both ways loaded, or to 162,146 if there was no return load.

With the present figures on motor traffic in and out of Manhattan there are indications that these vehicles are not approaching their best economic use. In the morning traffic there is an average of about two persons per car. The evening traffic does better, in that the average is slightly above 2.5 persons per car. But on Sunday the cars do better, the average of persons carried rising to above four per car. Trucks do not make so good a showing, as the average is only about 1.46 tons per car. An estimate of the average load capacity of these trucks is 2.5 tons per truck.

These figures merely show that the automotive vehicles are confronted with the same situation as the railroads in getting their equipment loaded to capacity. Time and good economics will eventually remedy this.

But here is the big point: With this volume of automotive traffic developing, what is the cost of unnecessary distance in the roads. Say each of the vehicles accounted for in the above tabulation were forced to run one mile farther than necessary because the highway was not straight. Say the average of gasoline consumption was 10 miles per gallon, or at the rate of 3.5c. per mile, you have this conclusion:

$$155,700 \times 3.5c. = \$5,449.50 \text{ daily.}$$

$$\$5,449.50 \times 365 = \$1,991,067.50 \text{ yearly.}$$

This is absolute waste, because it is entirely unnecessary travel, whether that travel be purely business or recreation. It also explains why the railroads have spent such large sums straightening their tracks to save fuel.

A lot of the work of taking the kinks out of the highways could be done for the cost of the gasoline consumed in going around, instead of straight to the point.

And these figures are for gasoline alone. The remainder of the cost of maintenance of the vehicle can be added to this daily and yearly bill.

Manhattan has felt its growing pains for some time. At present they are acute. The statistics quoted in this

story indicate the extent to which a once city-dwelling population has been squeezed into the outer area. They also indicate the extent to which the motor vehicle, through its passenger- and freight-carrying powers, has made this extension possible. There is no need to dwell upon the desirability of suburban residence as opposed to city congestion, and books could be written on the manner in which transportation in its more modern forms has been a boon to humanity.

One of the greatest developments before us is that of vehicular transportation. Among the things which to-day are pretty much in the dream class may be mentioned these:

1—Highways exclusively for motor vehicles; broad roads, smooth surfaces, adequate safeguards, channels for classes of traffic and safe exits and entrances.

2—The extension of these highways in a network across the country, going, for example, from New York to Boston without having to negotiate any severe grades, without having to pass through any congested spots and without any sharp turns or other speed-slackening factors. The Detroit-Toledo road would be a good place to begin.

3—Elevated thoroughfares in the larger cities. For example, several elevated highways from the Bronx to the Wall Street section of New York, with entrances and exits and channels for fast and slow and truck traffic.

4—Vehicular tunnels or adequate bridges over waterways and other similar obstructions.

5—Most important of all, the building of roads that will stay built. This means scientific roadbeds and proper surfacing, of which we have thus far had but little.

Since time began the world has been continually adjusting itself to more modern forms of transportation. It is still at it. Each adjustment lets civilization out an added notch, makes the business and living circle of each individual a bit larger. Right now we are at a point where the world is straining against the restriction of inadequate highway systems.

Before long the inadequate highway restriction will be a binding handicap on the growth of the automotive industry. To-day is a time to begin, and there is no work more important for the automotive industry than to lend its aid to the removal of this restriction before its effect is too keenly felt.

Experimental Concrete Road in Denmark

SOME official experiments with concrete roads have been undertaken in Denmark at the instance of the Viborg authorities on the Viborg-Aarhus high road. The experiments were carried on over a section some 1,150 ft. in length and 14.75 ft. wide, the camber being 1.50. The layer of concrete was 6 in. thick and it was strengthened with ribs 10 in. broad and 4 in. deep along the sides. The top layer, 2 in. thick, was made of concrete with small stones ranging from $\frac{5}{8}$ to $1\frac{1}{4}$ in. in diameter, the mixture being 1:2:4, while the formation layer was composed of gravel concrete mixed in the ratio 1:4:8. The top layer was placed upon the bottom layer immediately after the latter had been laid. For a short distance the concrete has been reinforced from light longitudinal and cross rods placed $2\frac{3}{4}$ in. from the surface in a layer of concrete 4 in. thick. Three weeks were allowed for the hardening of the concrete before the road was opened for

traffic. One part was tarred immediately and the remainder was left for a period of nine months for observation. The concrete road, in spite of fairly heavy traffic, has shown no cracks, and with the exception of a few isolated holes, about $\frac{5}{8}$ in. deep, it shows practically no signs of wear. The cost of the plain concrete portion amounted to about 1 kroner per sq. ft., the value of the old road material partly covering the cost of making up and removal; the reinforcement cost an additional 0.3 kroner per sq. ft., but the experiments have shown that the latter can be dispensed with under certain conditions.

ACCORDING to the Estonian paper *Waba Maa*, for Aug. 27, ploughing tests were made with the International Harvester Co.'s tractors on Aug. 26, many official persons being present. The results achieved showed that the machines are suitable for use in Estonia.

Heavy Automotive Taxes Suggested by Secretary Houston

Retiring Democratic cabinet official would require the automobile and kindred vehicles to pay almost one-tenth of the entire expenses of the National Government, without relief from other taxation.

IN his annual report, Secretary of the Treasury Houston has made specific recommendations for raising the \$5,000,000,000 which the present administration considers necessary for running the Government next year. The part of the tax recommendations which are of especial interest to the automotive industry are:

1. Increase of the sales tax from 5 per cent to 10 per cent, which it is estimated will make an increase of. . . . \$100,000,000
2. A Federal license of cars based on 50 cents per hp. 100,000,000
3. A consumption tax on gasoline at 2 cents per gallon 90,000,000
4. The truck sales tax will be continued at 3 per cent, despite efforts to have it eliminated.

New taxes from industry. \$290,000,000

The 10 per cent sales tax is applied, as now, to passenger cars, motorcycles, parts and accessories for these vehicles and will include tires.

These recommendations by Secretary Houston are about what those of the industry, who are familiar with the tax tendencies, expected from his report. They are practically the same as those recommended in the preliminary report of the National Industrial Conference Board. When this report was brought up for hearing recently at a New York meeting of the Board, the National Automobile Chamber of Commerce appeared before the Board and asked that these tax recommendations be revised. It was then shown that the automotive industry in 1919 paid almost \$150,000,000 in excise taxes to the national government, as follows:

- 1 Excise taxes on motor car sales. \$77,000,000
- 2 Excise taxes on truck sales. 14,000,000
- 3 Excise taxes on parts and accessories. 52,000,000

1919 taxes. \$143,000,000

In addition the automotive equipment pays:

- State and municipal registration fees. . . \$64,000,000
State and local taxes on the valuation
for personal taxes. 50,000,000

\$114,000,000

When this showing was made to the Industrial Conference Board that body immediately agreed that the industry was paying its share of taxes and they decided to make no recommendations for increased automotive taxes. During the hearing a member of the Industrial Conference Board asked if the industry did not want national registration of cars. The answer was that while this might be very desirable, that the industry did not want to pay \$100,000,000 for such registration.

There are some items of curious interest that develop in these tax proposals.

One is that if these recommendations were enacted into laws that the automotive industries would be required to pay, in excise taxes, practically one-tenth of the entire budget of the country and while bearing this heavy load would still be subject to all of the blanket taxes that cover other industries, such as income taxes, excess profit taxes and all local taxes on property valuation and merchants' licenses.

Another is that the taxes planned in this suggested budget are equal to about one-half of the expenses of the government on the last year prior to the war.

If all of the taxes now projected for next year became collectible, it would mean that a possible 8,000,000 cars would be taxed an average of about \$65 each. The importance of the National registration tax becomes especially interesting when it is compared with present state registration fees, which for 1919 were \$64,000,000.

As has been said, there is not much that is new thought in these tax suggestions. The gasoline tax was previously proposed. The stumbling block in the way of that tax is that Congress has no way of exempting the gasoline that is to be used for stationary engines for purely factory purposes, in cooking stoves and for necessary transportation, and Congress has shown no inclination to tax fuel for these purposes. Tax suggestions have to do with the "pleasure" car which is so very hard to find.

The general belief is that the short term of Congress, which will be the finishing up job of the Democratic administration, will not be permitted to take up taxes. The Tax Committee of the N. A. C. C. and other automotive and allied business associations have been assured of this program.

The N. A. C. C. Tax Committee, which is new in form but the work is not new, is drafting a definite tax program and will go before the proper congressional committee with a definite program. This committee is quite certain that these recommendations from a retiring Democratic official will not figure heavily in the plans to be made for the Republican Congress action.

THE establishment of a Chamber of Commerce of the United States at Pernambuco, Brazil, brings the announcement that twenty-eight such organizations are now functioning throughout the world as an aid to the promotion of the foreign trade of this country. The Pernambuco body, which is organized for the same purposes as are the older associations of a similar nature, is the fourth American Chamber of Commerce in Brazil, the other three being at Rio de Janeiro, Santos and Sao Paulo.

Other American chambers of commerce are located in Argentina, Bolivia, Chile, China, Colombia, Cuba, France, England, Italy, Mexico, Spain, Turkey, Germany, South Africa and the Philippine Islands. China leads all other countries in the number, with six. These are at Shanghai, Tientsin, Peking, Hankow, Harbin and Changsha.

Consider the Labor Problem From the Profit Angle

"War" is too often the only idea that comes out of a labor proposal but experience proves that "fighting" usually is unprofitable and unsatisfactory. The idea should be: That there is something in the problem to understand with a view of promoting the best interests of the business.

By Harry Tipper

SOME years ago when Mr. Edwin Hurley was assistant chairman of the Federal Trade Commission he referred (in his speech before the Association of National Advertisers in New York) to the number of corporations doing business in this country, and the small percentage of such corporations earning any money.

I do not remember the exact figures now, but the total number of corporations was about 100,000 and pretty close to half that number made no net income at all. A few thousand of the corporations of the country made most of the profits. It is to be noted in the records of failures in business issued by Bradstreet, that the outstanding reason for a failure is incompetence, the inability to do the thing which is required to keep the business going.

Even in the more ordinary requirements of business, such as a knowledge of costs, a proper consideration of depreciation, a knowledge of markets and a proper understanding of the expense of marketing, the examinations indicate that there is a very startling lack of knowledge.

Perhaps it is not surprising, therefore, that the human problem should be understood so little and that the methods used to deal with it should fail so frequently in accomplishing what they are expected to do.

The unfortunate part of this situation in connection with the human problem is the tendency for the average man to assert his opinion and defend his position in regard to human matters, where he is more or less willing to be informed by study and by examining the practice of others in the rest of his business problems.

One of the most important results of education is control, and it is to be observed that prejudices and passions are stronger and much quicker in their reaction among people who have not been subjected by inheritance and tradition to a long process of education.

In political matters we are demanding discussions and peaceful settlements and are thoroughly disgusted with the necessity for fighting which still appears to exist. In industrial matters, too frequently, we have not yet reached the stage where we are willing to have our opinions disagreed with, and sit down and consider the other side of the case, or to operate on the plan that discussion and agreement are better than division and warfare.

The very expressions which we use in our discussion of these matters indicate this determination to take sides and prove that our side is right altogether and the other side altogether wrong. We don't seem to realize that it

is possible for a man to be a radical without endangering society, and it is possible for a man to be a reactionary without being a soulless autocrat.

The labor union leader can see no justice in industry except through the intervention of the union and the carrying out of its program. Many manufacturers on the other hand can see no justice in the union program at all, and, apparently, believe that nothing can be accomplished except by the destruction of that type of organization.

The man who has the courage to see both sides of the case and to call the turn on what is right and what is wrong, is disowned usually on all sides. Of course, that is not true of all manufacturers by any means, but it is true of a great majority of the manufacturers or owners of industrial establishments and it is true of a great majority of the labor organization leaders. Here's a pertinent case:

We are writing you at this time to attempt to get you or your company into The Open Shop Association.

As the time is ripe for all manufacturing concerns to run their shop as they see fit and not be dictated to by some unscrupulous delegate of some union.

You may see the point that we are driving at very clearly. The Open Shop Association will do a great deal for its members.

1. Should you be threatened with a labor controversy or strike, you can immediately get in touch with us and we will handle that situation for you.

2. Should you want an under cover man on the inside amongst your employees we will also furnish you such a man, and you will receive a daily report on what is going on.

3. In the event of trouble we will replace any men that may strike against you.

4. We will establish welfare clubs in your plant from which you derive a lot of benefit, and all manufacturers are alive to this issue.

Our membership is growing larger every day and we would be glad to have you also fill out the accompanying application for membership in this institution.

The initiation fee is \$50.00, and the yearly dues \$25.00. Trusting that you will acknowledge receipt of this letter, we remain,

Yours truly,

American Employers' Open Shop Assn.

The whole tone of this letter presupposes that the labor situation demands warfare and the kind of warfare which does not exhibit too many scruples as to methods. This organization offers to take the situation out of the hands of the manufacturer, to furnish detectives who will give inside information, to furnish strike breakers and at the same time to establish a welfare club.

The man who has charge of any industrial plant is responsible for the human relations in that plant. It is his business to obtain men who will be stable in their employment, efficient in their work and contented in the organization. These things cannot be done unless the manager of industry knows the men who are working in his plant and understands them thoroughly.

To take any controversy out of the hands of this man and put it in the hands of an outside organization is to reduce the possibilities of settlement to the vanishing point and remove the responsibility for study which belongs to the management of business.

There must be some sarcasm in the paragraph which indicates the establishment of welfare clubs or else the words are unfortunate, as it is not usual to employ detectives to find out about people and at the same time offer them the glad hand of fellowship because of our interest in their welfare.

The history of the development of industry shows very definitely that the continuance of warfare has resulted in a distinct loss to the manufacturers. The laws which are on the statute books governing industry are the result very largely of this warfare, through the public attention which it has drawn to industrial matters.

The completely unionized condition in some industries is again the result of this warfare, the lack of interest, the suspicion and the other troubles which are familiar to every manager of labor have been intensified and deepened by the same process.

Even if the manufacturer wins a strike he loses in his future possibilities of production. Even where it is necessary to refuse agreement with labor because of its unreasonable demands, the necessity is an unfortunate one and leads to the destruction of industrial efficiency, just as clearly as the late war led to a destruction of political and governmental values.

The time which is spent in labor controversies which might have been spent in doing the work, represents an enormous loss every year, but that loss is only the smaller portion of it. The loss of incentive, the destruction of any idea of mutual obligation, the lack of interest in the work, and so forth, reduce the potential capacity of the individual to an extent which we have never visualized.

William James said that no man used more than 50 per cent of his intellectual capacity and for a great deal of the work which is done, that percentage would be liberal. The field for improvement in this respect is sufficiently large to be worth considerable attention. It cannot be developed without study, study which is at least as sincere, as careful and as pertinent as the study which is given to the mechanical equipment and the physical arrangements of manufacture.

It would be infinitely better if we would take a chip from our shoulders in regard to this industrial relations matter, and make use of a magnifying glass, so that we could see the things which escape our notice at the present time and which are more important than the physical symptoms of a strike or the temporary fluctuations back and forward in the efficiency of the individual worker.

When I was a boy, one of my respected teachers used to say about fighting, "Yes, I know you want to fight, you think you are insulted because you have disagreed, but fighting never bettered anything nor settled anything. Sometimes it cannot be avoided, but it is always unfortunate and in 90 per cent of the cases a little under-

standing would turn a prospective fight into an enduring friendship."

There are two things about the history of industry for the last 50 years which ought never to be allowed to slip from the mind of every man who has to handle men. They illustrate so thoroughly the methods which are available and the methods which have proved useless, that there is a clear, well-defined prospect before the man who really desires to better the industrial relations and is not concerned particularly with the establishment of his own prejudices or the carrying out of his own ideas regardless of their value.

The first of these is the result of the general progress of warfare between the craft unions as they have been organized and the employers, despite the fact that the growth of the craft unions has been fought out every step by the employers and in many stages fought very ruthlessly, these unions are far more powerful to-day than they were at the beginning of the warfare, and they are supplemented by a number of other unions which have grown up in the meantime so that the general union movement has increased very greatly.

It is true that in times of unemployment the union's privileges have been discarded to some extent, but when those times are past, such privileges have been restored and further advances have been made.

This is sufficient to indicate that there is no prospect of anything but a very temporary advantage in a continuance of the fight. What the manufacturer has apparently gained in winning one strike he has lost in a few years thereafter and the general record indicates that he has lost a good deal in the period of time over which the controversy has raged.

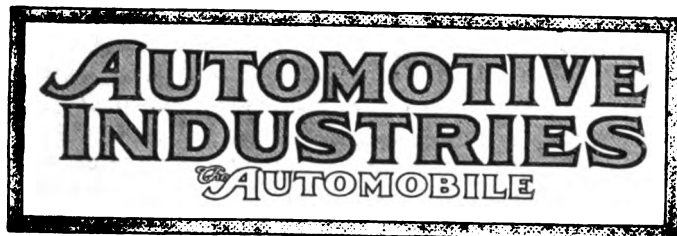
The second point of importance is the existence of individual establishments in almost every line of industry who have been able to avoid this warfare and who have been able to continue for many years without the existence of strikes or any big elements of labor trouble.

There are a sufficient number of these, and many of them are sufficiently old and well established to indicate that the individual plant can arrange its affairs with its workers so that they are contented, and are willing to disagree with their union on the strike question.

The present is a good time to study the labor relations because there is not the slightest suggestion of compulsion upon the manufacturer to do this, and any rearrangements which come out of his study will be more valuable on account of that fact.

Principles of Airplane Flight

A HIGHLY practical discussion of the principles of airplane flight is contained in "The Airplane" by Frederick Bedell, recently published by D. Van Nostrand, 25 Park Place, New York. In this book the author has treated the subject in a simple, fundamental manner and without the use of higher mathematics. No space is given to tracing the historical development of the airplane or to mere descriptions of type of planes, but the particular subject of the book is adhered to without attempting to cover ground frequently covered in more exhaustive works. Chapters are devoted to sustentation, resistance, thrust and power required for propulsion, climbing and gliding, performance at different altitudes, and longitudinal, lateral and directional stability. The book is well illustrated with diagrams and curves. It should serve well as a text book in elementary applied aerodynamics, or for the guidance of those interested in the basic principle of flight of heavier than air machines. It is also a useful reference book for engineers and designers interested in aviation.



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Against Commercial Bribery

IN these days when so many organizations are moving for legislation that strike at personal rights and pleasures, or which will become purely restrictive laws, it is rather refreshing to find an organization which is moving against a real evil, one that no honorable man will defend and which has become so deep rooted in business that many determined men have given up the fight to eradicate it. The movement referred to is that by the National Association of Purchasing Agents to obtain the passage of a bill that will make commercial bribery a penal offense. A definition of commercial bribery, as the purchasing agents see it, is "the giving of payment or gratuities to influence the purchase or acceptance of goods." The bill as drafted would extend immunity to the first informer.

It would seem that manufacturers and others who must rest so much of their cost of production on a purchasing department would strongly favor this measure. The movement to introduce such a bill into congress is under way and we suggest that in the

interests of better business that manufacturers urge its passage. The Federal Trade Commission has shown that such abuses of business position are very great.

Fuel Economy Contests

DURING recent years the automobile industry has not shown much enthusiasm for contests of any kind, which may have been due to the fact that business was so good that contests could not have made it any better. It will be admitted, however, that contests bearing on features to which the public attaches considerable importance at the time, have a powerful influence in quickening development of design.

As fuel saving is now such a vital issue we believe that much interest would be shown by the automobile public in a fuel economy contest held next spring. It is well known that American cars are sadly lacking in economy, our engineers having paid slight attention to this factor in the past, because fuel was relatively cheap and plentiful and customers laid much stress upon other qualities that conflict with economy. This was well shown in the recent French economy contest in which the several American cars entered made a poor showing in spite of having been fitted with special carbureters and tuned up by experts.

In the French trials an attempt was made to rate the performances of all the entries, from a cyclecar to a truck, by formula, so that there would be a single winner of the whole event. The wisdom of this plan is rather doubtful. Any formula that can be evolved must necessarily be of an empirical nature. For instance, everybody will agree that increased speed within reasonable limits is an advantage, but we would never get anything like unanimity on the question as to what difference in fuel economy would be balanced in value by a gain in speed from, say, 20 to 21 m.p.h.

We believe it would be a much better plan to divide the contestants into fairly numerous classes, so that only cars within such a price range as might appeal to the same purchaser would compete with each other. Of course, there would still be the ton-mile per gallon record of all contestants, and any specially meritorious performance would not be lost sight of. It will be readily seen that from a commercial standpoint it would be of little consequence if a \$6,000 car showed a better economy than a \$500 machine on a ton-mile per gallon basis. But to be the winner among a number of cars of substantially equal price or cylinder displacement would be a distinction that could be readily capitalized in a sales campaign.

In addition to stimulating research and technical development in connection with the more economical use of fuel, such a contest would have another beneficial effect. Numerous parties all over the country have been selling "fuel economy" devices for which they claim anywhere from 20 to 50 per cent saving in fuel. The public has generally been asked to take these statements on faith and has had little chance of checking them up. If economy contests were held regularly the buying public would soon learn to ask for official performances, and if these were forthcoming, would be guided by same. If no official performances

could be cited any claims of unusual economy would be regarded with skepticism.

If an economy contest was decided upon, the rules, of course, must be very carefully drawn up, so that when the results are announced they have a definite practical meaning. The greatest precautions must also be taken that all chances of error and all possibility of fraud are eliminated. Unfortunately there does not seem to be a single organization of standing in the automobile world that has facilities for conducting such trials, unless it be one of the larger dealers associations. We have not had a contest of a practical nature in this country for so long a time that our machinery for conducting them has become disorganized. However, if the contest itself is worth while—and we believe it is—an organization capable of conducting it will be found.

Reform of German Engineering Education

SINCE the armistice, German engineering schools have been much interested in plans for reorganizing their courses of study in accordance with "the newer intellectual aims and the economic shackles which resulted from the disastrous outcome of the war." At a meeting of the Society of Engineering Education held in Halle in May, definite plans were laid for bases on which the courses of study in mechanical and electrical engineering in all of the more important engineering schools of the country will be rearranged for the coming winter semester.

What led to this reform movement was chiefly the fact that the material to be dealt with in these courses under the old, rigid plan had grown to such an extent, owing to the enormous development of the industries concerned, that it could no longer be properly handled in the eight semesters composing the regular engineering course, and extending the course beyond the eight semesters was out of the question owing to the impoverishment of the country through the war.

It was decided to divide engineering courses into two parts of four semesters each. The first of these is to be devoted to a fixed curriculum and is to give the student the necessary equipment in the line of mathematics and physical science which is necessary in order to successfully master engineering problems. The subjects covered in the first half of the course would include higher mathematics, descriptive geometry, theoretical mechanics including properties of materials and graphostatics, physics and chemistry.

The second half of the course is to be entirely elective, and it will be left to the student whether he wants to acquire a broad general engineering education or go deeply into some special branch. The examination authorities will see to it that the subjects selected in the aggregate make up a course that may be regarded as of full value, and the examinations will be adapted to the studies pursued by the individual students.

While the first half of the course is to be devoted chiefly to the fundamental sciences, such as mathematics, it is not intended to go as far into these

sciences as has been the practice in the past, but only to give enough of them to meet the needs of those students who expect to go into administrative engineering work. Applied mathematics will be taught in the second half of the course, and it is hoped in this way to meet the complaint of some students with no particular fondness for mathematics and similar studies, that they are burdened with a lot of work for which they will never have any practical use. The time gained by limiting the instruction in mathematics and the physical sciences in the first half is to be devoted to economics and commercial practice.

It is believed that the new plan will be greatly to the advantage of students of higher intelligence, who will be able to progress much faster than under the old plan of a rigid course of study. It is also believed that it will work out to the advantage of the industry, as industrial concerns will no longer be compelled to pick junior members of their technical staff from a lot of young engineers all educated according to the same program but may obtain men educated in the particular branches in which their work lies. The preliminary course or first half is to be equivalent at all German engineering schools, in the interest of free migration.

Protection of "Good Will"

EVERY once in a while the courts speak out sharply concerning imitators of others' business policies. Recently a Nebraska judge restrained one of these imitators from doing himself and his customers further injury. This man, after investigations worthy of a better cause, succeeded in making a spark plug that was a very good imitation of one well established in the trade and which happened to be the plug selected for regular equipment on the Ford car. The imitator advertised that his plug was "standard equipment for the Ford car." He probably convinced himself that he had a right to do this because the plug was of the same type. But the court took another view and stopped him, saying that the company manufacturing the plug originally had a legal right to the "good will" created by selection of its product as Ford equipment. The strangest feature of such cases is that usually the same amount of energy put into a strictly honest endeavor would have brought success.

Insurance Men Ask Aircraft Laws

IT is interesting to note that the National Aircraft Underwriters' Association has decided to urge upon Congress the need for aircraft laws. It is perhaps surprising to some persons, even to some of those interested in aircraft, that flying has become so widespread that the insurance companies are taking it into consideration. It is significant for the future of aircraft that this is so. All those interested in the development of aeronautics should assist in this effort. There never has been a single sound argument against national laws for control of aircraft, but much sound argument for such control.

Industry Prepares for Trade Return

Factories Outline Larger Schedules

Promises of New Business Assume More Definite Form—Outline Sales Policy

DETROIT, Dec. 5.—Signs of recovery from the depression and the consequent slump in the automobile industry plainly are evident in the optimistic statements of manufacturers and dealers. While there is no attempt to ignore conditions or assume a too buoyant attitude there is a feeling permeating the industry that the upward trend will start with the show season and conditions gradually will improve with demand close to normal with the coming of spring.

W. J. McAneeny, president of Essex Motors, expressed the opinion that the New York show would see a sharp upward trend, and this conviction is shared by Alvan Macauley, president of Packard; F. J. Haynes, general manager of Dodge Bros.; C. D. Hastings, president of Hupp; H. M. Jewett, president of Paige, and G. C. Layng, vice-president of the Cadillac Motor Car Co.

Manufacturers, after close analysis of the situation, are agreed that the real problem now before the industry is one of energetic and aggressive merchandising backed by a conservative and sane manufacturing policy. That this will be reflected in the efforts of the manufacturers to outline a more comprehensive merchandising policy and insist on strict adherence to it, is shown in the plans already outlined for dealer conferences at the New York show.

Conditions in this district have ceased to be alarming. On the other hand, there is a more cheerful attitude apparent. Factories that have been down completely are again in production on a limited scale or are getting into condition for a resumption of operations. Reports from dealers throughout the country, manufacturers say, are optimistic, and marked improvement is indicated.

Olds to Start on 30 a Day

Olds Motor Works at Lansing, which has been out of production for several weeks, again was started Nov. 25, and the various departments will be put into operation gradually on a schedule of 30 cars daily, which schedule it is hoped to maintain until such time as demand justifies an increase.

Buick officials announced a reduction of 200 cars a day in output beginning Nov. 1, putting the daily schedule at 350. While the Buick factory has been operating full time the employee force has

MOTOR CAR INDISPENSABLE FACTOR IN INDUSTRIAL LIFE OF NATION

CHICAGO, Dec. 4.—The National Bank of the Republic of Chicago does not have to be convinced of the indispensability of the automobile; it is convinced already.

In its monthly review of business it discusses the automobile situation. "It was to be expected," it says, "that the automobile industry should experience something of the same process of readjustment through which other industries are now passing. Due to the magnitude of the industry and to the large number of competing units it was inevitable also that contraction should be sudden and drastic. The impression had gained currency earlier in the year that the point of saturation had been reached in the distribution of automobiles, and it needed but the threat of widespread unemployment, or of decreased purchasing power in any section of the country, as for instance the grain states, to make the saturation a reality, temporarily at least.

"Once the ice was broken by the largest producer in the field, price cuts and curtailment became general of necessity. Except in one or two instances the naming of lower prices has been ineffectual in increasing sales, with the result that curtailment has continued general in the industry. As regards the immediate outlook, great stress is laid on the fact that normal replacements should take up at least one-half of the motor manufacturing capacity.

"But the saving fact in the situation is that **THE AUTOMOBILE HAS LONG SINCE REACHED THE POINT WHERE IT BECAME AN INDISPENSABLE FACTOR IN THE INDUSTRIAL LIFE OF THE COUNTRY, AND AS SUCH IS ASSURED OF A STABLE FUTURE.**"

been cut materially and the plant has not kept to schedule. Reports from Buick dealers indicate a steady demand with an apparent upward trend as the consumers become convinced that price cutting has ceased. Buick is one company that still is behind in deliveries. This is noticeable particularly in the Eastern territory. Despite the steady demand and the confident feeling that buying will reach somewhere near normal in the spring, it is hardly likely that the Buick factory will attempt to get beyond the production outlined in the readjusted schedule.

Reo Keeping to Normal Output

Reo Motor Car Co. is one of the few that is keeping to normal output. While there has been some cut in time schedules, Reo has not decreased its force and the factory can be said to be operating at capacity with the production program divided about 55 and 45 per cent with the speed wagons getting the larger share.

Cadillac, despite the fact that the employee force has been cut materially, is keeping to an output approaching normal, around 2000 cars a month. Cadillac factory, according to Layng, is working full time six days a week; increased efficiency of labor permitting maintenance of the normal production schedule despite the cut of between 35 and 40 per cent in the working force.

Ford Motor Co., which has been keeping above the announced schedule of 4000 since Sept. 1, will close down Dec. 15.

The plan is to utilize the time until the first of the year in taking inventory. No one would say definitely at the Ford plants that operations would be resumed immediately after New Year.

Hudson-Essex officials, having balanced inventories and put both factories into shape for resumption of full time schedules, are negotiating contracts for parts and materials with the idea of getting both factories into operation on a limited production schedule with the idea of keeping close to demand but never anticipating it and creating a surplus in consequence. The Essex plant is closed tight, though according to President McAneeny, the Hudson plant is being operated and both types of cars are being produced there. President McAneeny said it was proposed to build 1100 cars during December, but declined to say how the output would be divided as between Hudson and Essex or what cars had been produced in November.

Masten Confident Tide Turned

W. H. Masten, general manager of Oakland at Pontiac, declared he had full confidence in the future and expressed the opinion that the tide had turned. Masten also predicted that the show season would see a noticeable improvement in demand and predicted a continued upward trend with the probability that the curtailment in production in the last two months would result in inability to supply the demand in the spring. Oakland had planned to resume operations, after

(Continued on page 1192)

Normal Business Soon, Says Reserve

Transition Process Nears Completion

Little Further Distress Seen in December Statement—Ex- change Hurts Exports

WASHINGTON, Dec. 5—Normal business conditions will soon be restored with far less than usual distress, declares the Federal Reserve Bulletin in its December issue. There is good reason for believing, it asserts, that the difficulty of the transition process through which business has been passing will not be much further aggravated.

The foreign exchange situation is declared to be in some measure responsible for the slowing down of the export trade of the United States, and illustrates further the necessity of action designed to bring about soundness in international financial relations.

Easement of credit conditions with reductions of rates of interest on call money, time funds and to a moderate extent for commercial paper was set forth in the Bulletin. Country banks have been active buyers of commercial paper during November principally as a result of the liquidation of farmers' obligations.

The Board has noted further price recessions as the general index shows a net loss for the month of eighteen points. Activity of manufacturing in many lines has been still further reduced and there has been some increase in unemployment. There has been a corresponding reduction of buying power which is reflecting itself in a noticeable way in a lessening in the volume of trade.

While business failures have continued to increase as compared with a year ago, the total growth in assets of failed concerns has been moderate. The general opinion of bankers and financiers is to the effect that the process of readjustment has been kept under control and has produced as little economic disturbance as might reasonably have been expected. It is impossible to estimate the extent to which the completion of the readjustment process may involve further slackening of employment or the increase of commercial embarrassment.

H. E. MONFORT DIES

ROCK ISLAND, ILL., Dec. 3—Harry E. Monfort, assistant superintendent of the Rock Island Plow & Tractor Co., died here of apoplexy. He was aged forty-nine and for eight years had been superintendent of the La Crosse (Wis.) Plow Co., and had also held important positions with the Syracuse Chilled Plow Co. and the Oliver Chilled Plow Co.

TURNING POINT NEAR, FEDERAL RESERVE VIEW

In its December Bulletin the Federal Reserve Board says:

"The fiscal situation both at home and abroad is still uncertain, due to the fact that while the war was technically over at the signing of the armistice it was not over in the financial sense until a long time later, while it has not been possible during the readjustment period to place public finance in any country upon its peacetime footing, pending much closer ascertainment of the best method of taxation.

"The close of the year 1920, however, in spite of the fact that in some branches of economic and financial life there is still much progress to be made before reaching a definite basis for further growth, must nevertheless be regarded as quite unmistakably a turning point in the process of transition from conditions produced by the war to the normal economic basis of international and industrial life."

Railroads Increase Equipment for Cars

NEW YORK, Dec. 6—The Wheeling & Lake Erie Railway has informed the traffic department of the National Automobile Chamber of Commerce that in ordering 1000 new box cars it has followed the suggestion of Traffic Manager Marvin that the cars be provided with staggered doors 7 feet in width. The Kansas City Southern is arranging to widen the doors of 100 of its furniture cars to take care of automobile shipments. The 3500 automobile cars ordered by the New York Central will be delivered beginning this month. The car service division is urging all railroads to repair and rebuild equipment now to meet needs later.

TO MAKE DETACHABLE RIM

SYRACUSE, Dec. 3.—The Federal Detachable Rim & Wheel Corp., capitalized at \$2,000,000, has filed a certificate of incorporation in the County Clerk's office. It will manufacture and sell a detachable rim especially adaptable to types of automobiles not regularly equipped with demountable rims. It also holds patents for other automobile accessories which will be marketed later. The stock is equally divided between preferred and common. The president of the company is D. Robert Croly and James H. Higgins is the secretary and treasurer.

Few People Buying, Reserve Bank Notes

Lack of Finances Prevents Usual Manufacturing Now for Spring Business

CHICAGO, Dec. 6—Recession in business activity both from the viewpoint of production and consumption is noted by the Federal Reserve Bank of the Seventh District in its monthly summary of conditions. This decline is accompanied by steadily increasing unemployment, though readjustments in both industrial and commercial lines are proceeding in an orderly fashion. The district includes Detroit.

With specific reference to the automobile industry the bank finds that "in the automobile industry there is a marked slowing down both in production and shipments, as is evidenced by the movement of cars from the factory by rail, boat and driveway, and by the increasing number of unemployed in automobile centers. Advices from automobile manufacturers are that very few people are buying and that consumers are putting off the day of making commitments, hoping for further price reductions.

"With the exception of some of the larger automobile manufacturers, plants are reported either to be closed or operating on such a small scale that their production is running not much in excess of 20 per cent of normal. There are at least four plants in the Seventh Federal Reserve District which report operations from 50 to 75 per cent of normal.

"While the compilation of figures showing the number of cars produced during the twelve months ended June 30, 1920, has not been completed, it has progressed sufficiently to indicate an output of approximately 2,000,000 automobiles and 340,000 trucks for the year. The output of motor vehicles during the calendar year 1919 was 1,657,652, and the number of trucks 316,340.

Finances handicap storage

"During the winter months automobile manufacturers produce the stock of cars which are sold and delivered to users during the early part of the coming automobile season. A year ago manufacturing was at high speed, owing to the ability of dealers to stock up and finance these operations. Manufacturers are unable to store cars ahead, both for financial reasons and for want of space; and the credit situation, as well as uncertainty as to the probable requirements, is restricting the demand from dealers for cars to be stored by them against next year's requirements." Unemployment apparently is growing.

Business Integrity Remedy for Slump

United States Chamber of Commerce Urges Return to First Principles

WASHINGTON, Dec. 6.—Cancellations which created considerable uneasiness in the automobile trade and other business of late were in the main due to loose business practices and other irregularities incident to wartime, according to the conclusions reached by the Fabricated Production Department of the Chamber of Commerce of the United States to-day in an analysis of the cancellation evil. It is suggested that the most effective remedy would be a quick return to the fundamentals of sound business and the establishment of firm integrity.

"We feel" says the National Chamber, "that perhaps the most effective remedy must be the one that will call us back to first principles, to where we can point with pride to our house as one that fills its orders and keeps its contracts. There are many in all lines who have through all this upheaval stood steady and right—preferring to take loss rather than mar a lifetime record of good performance."

"Dun gives the total volume of commercial failures in May, 1920, as \$10,826,277, and in October, 1920, as \$38,914,659, while in October, 1919, the total was \$6,871,966. But the monetary loss was not the greatest loss, although many went to an untimely business grave because somebody did not make good."

"The apparent lowering of business standards has made doubtful the value of business written and placed upon the books for future shipment. Production schedules could not be definitely worked out because of this increasing doubt."

C. C. U. S. DISCUSSES GUARANTEES

WASHINGTON, Dec. 3.—Both sides of the question of price guarantees are given in a bulletin issued by the Fabricated Production Department of the Chamber of Commerce of the United States. The important argument in favor of this practice is that it makes for more economical production and distribution. In opposition to this it is stated that it is an unsound, unfair business practice, because it creates an artificial volume of orders for the manufacturer, and because it puts the wholesaler's and retailer's just share of liability for market fluctuations on the manufacturer. It is also said that it tends to keep prices up, and reacts unfavorably on the small manufacturer.

NORTHWAY MOTORS SECURE

BOSTON, Dec. 4.—James F. Cavanagh, president of Northway Motors, has written a public letter to call attention to "false rumors and malicious statements, obviously intended by their creators to impede the continued progress and successful development of Northway Motors Corp. to injure the sale of Northway trucks, and to depress the market value

of the stock issues of the company."

This comes as a result of a rumor that Northway Motors had suspended operations of its Natick plant. After a statement of actual business and workers at the plant he said: "The general business depression, which has temporarily closed various Western automotive plants and many Eastern industries, finds the Northway plant at Natick in continuous and successful operation."

Open Winter Signs Aid New England Trade

BOSTON, Dec. 4.—A. H. Sowers of the Lexington Automobile Co. said yesterday on his return from a swing around the circle through Maine, New Hampshire, Vermont, Western Massachusetts and Rhode Island:

"In the States above us the people have figured out that we are going to have an open winter. They pointed out that this time last year in some places they were buried in snow, and remained so until spring. Many places I visited the ground was green and the roads good. Some places the farmers had busied themselves with breaking out the ground instead of waiting until spring."

"Commercial travelers said they were not getting a whole lot of orders, but neither were they getting hard looks and cancellations. People had resumed buying a bit more freely. My dealers have recovered from the dumps and they are out now selling cars and tractors."

Simons Finds Sales Largest in History

DETROIT, Nov. 29.—By way of dispelling gloom and injecting enthusiasm into his dealer organization, Guy O. Simons, president of Simons Sales Co., Overland and Willys-Knight and Handley-Knight distributors, told a gathering of more than one hundred Overland dealers that September and October business of the concern was the largest for the same two months in the company's history. Despite the slump the firm up to the end of October had delivered cars exceeding \$4,500,000 in value, and with two months remaining in the year had beaten the 1919 record by \$1,250,000.

While his statements and comparisons dealt specifically with his company, Simons stressed the point that readjustment had not affected automobile sales to anything like the extent the public had been led to believe and declared the facts with regard to his own concern were true in many other cases.

GIVES TEN-YEAR GUARANTEE

INDIANAPOLIS, Dec. 3.—Twenty five pumpers and ten service trucks have been purchased by the city of Indianapolis from the Stutz Fire Engine Co. as part of the plan to completely motorize the city fire department. The company has given bond to the city under which the company agrees to make all repairs and replacements for ten years.

Central Ohio Finds Revival in Demand

November Best Truck Month in Past Six—Financial Situation Easier

COLUMBUS, Dec. 4.—With the present year coming to a close, an improvement in the automobile industry is reported in central Ohio territory. The lull which took possession of the passenger car and truck market in the latter part of September and October is passing slowly and in its place is appearing a better feeling. This has resulted in increased sales of motor vehicles, although business is not near normal and will not be for some time.

In the truck business is the most decided improvement. Prospective purchasers are not hesitating as much as formerly and are placing orders. Truck users are not especially increasing their truck equipment, but are buying to replace worn-out equipment. Inquiries are more numerous and Columbus truck dealers report November the best in five or six months. Prospects are good after the first of the year, when Christmas buying is over and retailers have cleaned up stocks and have money for increasing truck equipment.

In the passenger car field, while improvement is noticeable, it is not so pronounced as in the commercial vehicle department. All lines now have price guarantees or reductions and the public is not showing the hesitancy it exhibited previously. While buying is being done cautiously, sales are more frequent and this shows a better feeling. The purchasing power of the public as far as the city is concerned is not impaired to any great extent and dealers expected that sales after the first of the year will show a marked increase. In the rural sections the passenger car industry has been hard hit by low grain and stock prices and little is expected from that source in the immediate future. Farmers generally are holding off, as they are holding their grain for higher prices.

As to the financial situation, some improvement is reported from all parts of central Ohio. Bankers are becoming more liberal and the financing of dealers is going ahead on a more liberal plane. Money is in fair supply and bankers have changed their policy on loans to dealers and distributors.

TO AUCTION MOORE PLANT

DANVILLE, ILL., Dec. 3.—The buildings, automobiles and all other property of the Moore Motor Vehicle Co., which has been in the hands of a receiver for the past four months, will be sold at public auction Dec. 22, following the issuance of an order by Judge English in Federal Court. C. B. Thomas, the receiver, will be in charge. In addition to the buildings and contents there is a tract of 58 acres of land, together with the underlying coal and other minerals.

Business Must Meet Demands on Prices

Cleveland Bank Lays Tie-up to Buyers Strike for Purchasing Rights

CLEVELAND, Dec. 6—In the latest monthly business review issued Dec. 1 by the Federal Reserve Bank of the Fourth District it reiterates the statement made in the last bulletin that passenger automobile makers are inclined to optimism for the future.

"A prominent manufacturer has stated to us," continues the letter, "that the apparent slowing up of the industry is seasonal and that the volume of fall business compares favorably with that of former years except for 1919, when apparently the demand for cars was in excess of the ability of makers to produce them.

One of the large motor truck makers says that "the motor truck business with us, and from all accounts we have from other manufacturers, is only about 20 per cent of normal, and that the slacking off of business has so increased the overhead that it will consume some slight reductions made in materials."

The demand for automobile bodies has slumped in proportion to the lessened demand for cars and prices are being slightly revised, according to the report.

Business in practically all lines throughout the Fourth Federal Reserve District continues to recede in volume. Buying has been greatly restricted, and the result has been felt all around the circle from consumer to manufacturer. Cancellations are still being received, although the tendency to cancel orders is not as marked as during the past few months.

Labor continues to increase in effectiveness and unemployment is increasing. Collections continue good in most lines. Inventories are large in many instances, but the volume of loans required to carry them has been substantially reduced.

Buying Must Be Stimulated

"The foremost problem confronting business today," the bank says, "is how to secure a return of the public to the market and to stimulate buying. Business is again suffering from a strike, but this time from a new and unexpected quarter. It is not a strike for shorter hours nor for higher wages, but takes on the nature of a strike for recognition that the public holds the purchasing power of the nation and that it will not be drawn into the market except for absolute necessities until it is convinced that prices are as low as may reasonably be expected and bear some evidence of stability.

"How best to secure a resumption of buying is a problem that each business man must solve for himself. But regardless of how the desired result is to be brought about, it is evident that the entire burden of readjustment cannot be

CONDITIONS SPOTTY; WATCH NORTHWEST

NEW YORK, Dec. 6—Business conditions and trade possibilities throughout the United States are "spotty." There are a few sections where sales continue good but in general there has been a marked recession, although a better trend is becoming apparent in many places.

The states in which business now is best are California, Oklahoma, Florida and Maine. Trade conditions are dull or slow in the steel centers and in most of the industrial sections, but a marked improvement seems to be about due in Pennsylvania and Ohio.

There are unmistakable evidences that the late winter or early spring will bring improved sales conditions in New York, New England and most sections of the South. The process of adjustment is not yet completed, however, and the industrial field will be filled with uncertainties for some time to come.

It is highly probable that the final turn toward normal will first appear in the industrial section of the Northwest. That district was the first to hit bottom and it probably will be the first to recover. It may be regarded as a sort of industrial barometer, and manufacturers will make no mistake in watching it carefully.

passed to the ultimate consumer. Substantial progress in the readjustment has been made in some quarters. Manufacturers have vigorously tackled the proposition of disposing of large and expensive inventories with a considerable degree of success.

Retailer Nullifies Price Cuts

"Wholesalers and jobbers have in many cases made substantial cuts in prices in an effort to stimulate buying, even though such reductions carried with them losses in greater or lesser degree. Justly or not, there are many who insist that the retailer has nullified any good accomplished by the wholesalers and manufacturers by refusing to reduce his prices to a cost replacement basis."

CARBURETER WEEK OPPOSED

NEW YORK, Dec. 4—The suggestion of the Standard Oil Co. of California that a carbureter adjustment week be held in that section where there was some shortage last spring, has not met with the approval of the directors of the National Automobile Chamber of Commerce. It is felt that such a campaign would cause unnecessary alarm, and make it appear that a shortage was pending, whereas it is the opinion of prominent oil men that the supply of gasoline will be ample. Final decision on the subject was left to the California dealers.

Crop Prices Keep Southern Sales Low

Normal Business Considered Year Away—Many Used Cars Placed on Market

NEW ORLEANS, Dec. 6—General business conditions in the South have suffered severely because of the slump in the cotton, sugar and rice markets. The planters who produced these crops at war costs will have to sell them at losses ranging from 17 to nearly 35 per cent. Labor is still on a war basis. Materials are still high and there has not been any reduction in retail prices of foodstuffs comparable with those the wholesale reductions would lead the consumer to expect.

There is little probability of any return to conditions resembling normal before the maturing of next year's crops. In order to effect this revival costs of production will have to fall an average of 30 per cent. This means either that wages must be reduced or that 30 per cent of the men now employed in the crop's production must be laid off and the remaining 70 per cent forced to produce all that the 100 per cent are now producing.

Just how this will be accomplished is not clear, even to the producers. Approximately two-thirds of the labor of Louisiana, Mississippi and east Texas, excluding the oil fields in East Texas, is employed in the production of cotton, sugar and rice. During the war and up to six months ago these people enjoyed a prosperity they never had enjoyed before and never had expected. The result was that 99 per cent of the producers, both planters and workers, spent their money extravagantly. As an example of this it is stated that there are more than 2000 used automobiles for sale in Louisiana to-day by owners.

This statement of conditions should not be misconstrued, however, as meaning that there is no purchasing power in this section of the South. There are still vast sums available and a great part of this money will be spent in the next year. Automobile dealers who are employing modern business methods in the search for sales are having a fairly profitable business.

It is probable business in this territory in the next year will exceed that of any pre-war year, but it will be far below the level which was reached after hostilities began and the world came to the South for these three great staples.

BLACK & DECKER OPENS OFFICE

BALTIMORE, Dec. 4—The Black & Decker Mfg. Co. has established a branch at 303 Penn Avenue, Pittsburgh, in charge of W. D. Royer, formerly sales engineer of the Robbins Electric Co. of Pittsburgh. A service station will be maintained and the branch will be headquarters for adjacent parts of New York, Pennsylvania and West Virginia.

Automotive Studies to Cost \$1,800,000

Governmental Bureaus Outline Investigations Affecting In- dustry for Coming Year

WASHINGTON, Dec. 6.—Appropriations aggregating \$1,800,000, which will directly affect the development of the automotive industry, were asked of Congress to-day in the estimates for the fiscal year ending June 30, 1922, as furnished by the several executive departments and other Government offices to the Treasury. This figure is based on the items in which the industry has manifested an interest, and represents a substantial increase. Provided Congress approves the estimates without reductions, the departments concerned will be in a position to expand their activities.

There are four Government bureaus with which the automotive industry has direct relations: The Bureau of Standards, the Bureau of Public Roads, the Bureau of Foreign and Domestic Commerce and the Bureau of Mines.

The Bureau of Standards has asked for an appropriation of \$100,000 which will permit the establishment and maintenance of a new division dealing exclusively with automotive engineering. This fund will be expended for the maintenance and equipment of automotive engine test plants, including vacuum and refrigerating machinery necessary to simulate atmospheric conditions at altitudes up to 40,000 ft., supplies, equipment, and operation of laboratories for testing engines and materials used in their construction and operation, lubricants, carbureters, ignition devices, radiators and cooling systems, chassis and power transmission systems, and other researches incident to the standardization and development of automotive power plants.

The bureau further proposes to spend \$45,000 to develop methods of testing and standardizing machines, motors, tools, measuring instruments, and other apparatus and devices used in mechanical, hydraulic, and aeronautic engineering. An appropriation of \$70,000 is also asked to aid the bureau in metallurgical research.

To Study War Developments

Because of the bureau's co-operation with automotive engineers it is interesting to note that an appropriation of \$250,000 is required for the next fiscal year for technical investigations in co-operation with the industries upon fundamental problems involved in industrial development following the war, with a view to assisting in the permanent establishment of the new American industries. It is also requested that \$25,000 be appropriated for the use of the Bureau to determine experimentally important physical constants.

For laboratory and field investigations of suitable methods of high-temperature measurements and control in various industrial processes and to assist in making

available directly to the industries the results of the bureau's investigations in this field, \$15,000 is the amount to be appropriated for 1922. For the promotion of studies in safety standards in the large industrial plants of the country and the formulation of codes the Bureau of Standards wants \$25,000. It also wants \$25,000 to inquire into specific and latent heats of metals and alloys, the electro-chemical equivalent of metals and the velocity of light.

Aeronautics Asks \$489,906

The National Advisory Committee on Aeronautics wants an appropriation of \$489,906 for the fiscal year of 1922. This sum will be used for scientific research, technical investigations, and special reports in the field of aeronautics, including the necessary laboratory and technical assistants; traveling expenses of members and employees; office supplies, printing and other miscellaneous expenses.

Because of the importance of developing foreign markets for automotive products, the industry has constantly advocated increases in the personnel of Government commercial attaches. The Secretary of Commerce has recommended that \$300,000 be appropriated for the promotion of commerce overseas. This figure represents a large increase as the appropriation of \$171,000 for the current fiscal year has proven inadequate. A supplemental appropriation of \$500,000 is asked to cover other phases of foreign trade promotion.

The Bureau of Public Roads contemplates an extension of its work next year as its estimates reflect large increases. An appropriation is asked for 1922 which will be used for inquiries in regard to systems of road management and economic studies of highway construction, operation, maintenance and value, either independently or in co-operation with other agencies and for giving expert advice on these subjects. The current appropriations amount to \$36,200. It is proposed to increase the salary of the bureau chief from \$5,000 to \$7,500. This increase is in line with similar recommendations of the Secretary of Agriculture for divisional officials.

Highway Laboratory, \$150,000

To supplement the \$75,000 appropriation now available for the construction of a laboratory building on the Arlington Farm property of the Department of Agriculture as permanent headquarters for the testing and research work of the Bureau of Public Roads, the amount of \$75,000 has been requested.

Fifty thousand dollars is required by the Bureau in investigations of the chemical and physical character of road materials, for conducting laboratory and field experiments, and for studies and investigations in road design, independently or in co-operation with State highway departments and other agencies for conducting field experiments and various methods of road construction and maintenance, and investigations concerning various road materials and preparations;

(Continued on next page)

Exports of Engines Show Falling Off

Airplane Exports and Gas Engines Gain—Car and Parts Imports Grow

WASHINGTON, Dec. 6.—Ten airplanes were shipped abroad in October, 1920, valued at \$147,600, as compared with three and a value of \$23,000 for the same month last year. A total of 56 planes valued at \$546,174 have been sent overseas during the first ten months of this year.

Though the total for ten months ending October exceeds the corresponding period last year, reports show a slump in the volume of exports of automobile engines. Only 496 engines of this type were exported as against 2,889 engines for October, 1919. Tractor engines also showed a decrease in volume of exports. The shipments for October, 1920, amounted to 1,584 engines valued at \$1,681,359 as against 1,748 tractor engines valued at \$1,528,673 for October, 1919.

The exports of stationary gas engines aggregated 2,844 engines valued at \$472,399 for October, 1920, as compared with 1,408 engines valued at \$245,213 during same month last year. The total number of gas engines shipped during October, 1920, amounted to 5,543 engines with a value of \$2,537,544, a decrease in numbers but an increase in valuation over the 6,861 engines, valued at \$2,422,528, sent abroad in October, 1919. The aggregate for ten months of this year shows 82,748 engines valued at \$30,535,634. For the same period last year it amounted to 74,608 engines with a value of \$28,789,165.

Imports of automobiles for October, 1920, totaled 41 cars valued at \$63,487 as compared with an importation of 21 cars for same month last year. For the ten months a remarkable increase is shown in statistics giving a total of 787 cars valued at \$858,397 for 1920, compared with 88 cars valued at \$43,727 last year. Parts, except tires, imported during ten months of this year amounted to \$1,028,992 while the imports for ten months of 1919 aggregated \$171,907. The value of \$93,077 for October, 1920, represents an increase of 300 per cent over the same period last year.

During October, 1920, 459 automobiles manufactured in this country were returned. The total returned for ten months of this year was 4,849 cars valued at \$7,718,372.

BRITISH FAIR DATES SET

NEW YORK, Dec. 6.—The British Industries Fair, regarded as the most important trade exposition conducted in Europe, will be held at London and Birmingham from Feb. 21 to March 4 and at Glasgow from Feb. 28 to March 11. Only British manufacturers will be permitted to exhibit. Admission will be only by invitation but cards may be obtained at the British consulate general in this city.

Chrysler Production to Start in Spring

**Elizabeth Factory Completed at
Cost of \$9,000,000—Position
Considered Favorable**

NEW YORK, Dec. 6—The Willys Corp. has issued a statement concerning the Chrysler Six automobile which says:

"Production of the Chrysler Six automobile, which may be regarded as the company's most important project, will begin in the spring of 1921. Factory at Elizabeth, N. J., is substantially completed and is being occupied. Total expenditure for this factory property will be about \$9,000,000 which approximates the company's original estimate.

"It is fortunate that production of the new car has been delayed. This is to the company's advantage because of the fact that it will come into production at a time more favorable both for the purchase of materials and sales to the public.

"Willys Corp. at the time of its formation in September, 1919, owned 500,000 shares of Willys-Overland common stock, or substantially one-third of the then issued common stock of the company. Last July Willys-Overland increased its capital and Willys corporation increased its holdings correspondingly to 730,000 shares, thereby maintaining its position of holder of one-third of the voting stock of Willys-Overland.

"This increased investment in Willys-Overland was made from surplus profits and from the sale of securities junior to the first preferred stock. Entire proceeds from the sale of Willys corporation first preferred stock have been devoted to the erection and equipment of the Elizabeth plant and for working capital as originally contemplated. Inventories and notes and accounts receivable have increased approximately \$6,600,000 to Sept. 1, 1920."

ALLIS MAKES 12-20 TRACTOR

MILWAUKEE, Dec. 4—A new three plow tractor with a 12-20 hp. rating is being brought out by the Allis-Chalmers Mfg. Co. It is geared for a low speed of 2½ m.p.h. and a high speed of 3¼ m.p.h. at 1100 r.p.m. of the engine. A drawbar pull of 2000 lb. on high gear is guaranteed. The belt pulley is 13 in. diameter and the belt speed, 2700 ft. p.m. The first sample of this model was shown at the Wisconsin State Fair but several minor changes will be incorporated in the production job. The price has been set at \$1,350.

ORGANIZE AUTOMOBILE UNION

BOSTON, Dec. 4—As part of a national campaign for the organization of an automobile department union, within the International Association of Machinists, but separate and distinct from the present locals of machinists, repair and railroad departments, E. P. McKenney,

general organizer for the international, has arrived in Boston to take up the work of establishing a Boston local union among the automobile men.

Up to the present time machinists and other workers in the automobile trades have been members of machinists' locals, which embraced workers in various trades outside the automobile industry. Machinists' work in the automobile industry, however, differs so widely from that of machinists in other lines of work that it was felt by the international body that they should have local unions distinctly their own.

Automotive Studies to Cost \$1,800,000

(Continued from preceding page)

for investigating and developing equipment intended for the preparation and application of bituminous and other binders.

The Bureau wants \$77,300 appropriated for its use in a study of road making by the use of local materials and for the investigations of the best methods of road making, especially ordinary sand-clay and dirt roads, and the best kinds of road-making materials, by the use of local materials; for studying the types of mechanical plants and appliances used for road building and maintenance; for studying methods of road repair and maintenance suited to the needs of different localities; and for furnishing expert advice on road building and maintenance.

The Bureau of Mines evidently intends to extend its research and conservation movement as to fuels for they have asked for \$453,840 which will be devoted to inquiries and investigations concerning the mining, preparation, treatment, and utilization of petroleum and natural gas, with a view to economic development and conserving resources through the prevention of waste; to inquire into the economic conditions affecting the industry.

An additional \$175,531 is wanted for investigation of mineral fuels and unfinished mineral products belonging to or for the use of the United States with a view to their most efficient mining, preparation, treatment, and use, and to recommend to various departments such changes in selection and use of fuel as may result in greater economy.

\$100,000 Asked for Road Study

As the organizations in the industry interested in the promotion of highway education expect the Bureau of Education to take an active part in the movement it is significant to note that an appropriation of \$100,000 is asked for the investigation and development of methods of educational extension through cooperation with State departments of education, universities and colleges, and other public educational agencies in the States; the preparation and circulation of material for class instruction, correspondence instruction, and visual instruction; the promotion of community organization and public discussion.

Receiver Appointed for L. W. F. Company

**Failure of Government to Enact
Air Program Blamed for
Difficulties**

NEW YORK, Dec. 6—Failure of the Government to evolve and put into effect a definite aeronautical policy or program is blamed for the financial difficulties of the L. W. F. Engineering Co. of College Point, said to operate the largest aircraft manufacturing plant in the United States, which has been placed in the hands of Ernest Whitbeck as receiver. The company is said to be entirely solvent, but is cramped for funds to meet current obligations because of troubles similar to those which have confronted many other companies. It is believed its affairs can be straightened out under a receivership.

The receivership is held to be a direct outcome of the policy of other nations to develop their own aviation at the expense of the United States. The plan first became apparent when Handley Page, Ltd., of England, began the dumping here of surplus aircraft which it had purchased from the British Government for a fraction of its cost.

The second blow at the industry in America, and a more telling one than the dumping here of antiquated machines, was the attempt of German manufacturers to penetrate the American markets. This came with the purchase by the Postoffice Department, without adequate tests, of all metal Junker planes, which were hailed as a revolution in aircraft manufacture. These planes have not been successful in practice.

The L. W. F. company was organized in 1915 with a capital of \$1,000,000. At the time of the armistice it employed 2200 persons. It was the originator in this country of the laminated wood fuselage and it built the plane which was the first to fly with a Liberty engine. Its plant covers five city blocks.

The receivership came almost simultaneously with the annual report of Major General Charles T. Menoher, chief of the air service, in which he said that "unless the Government aids the airplane industry, it cannot hope to depend upon the availability of suitable commercial aircraft and facilities for their employment, nor upon the existence of manufacturing plants and supplies of materials necessary for the rapid production of aircraft in time of war."

P. & J. TO BUILD EQUIPMENT

MILWAUKEE, Dec. 6—A charter has been granted to the P. & J. Motor Co. of Cudahy, a suburb of Milwaukee, which is incorporated with an authorized capital stock of \$250,000 to manufacture and sell gas engines, automotive parts and equipment and metal products of all kinds. The incorporators are represented by James S. Guy and Charles B. Charles, attorney, Milwaukee.

Industry Prepares for Trade Return

Factories Outline Larger Schedules — Promises of New Business Assume Definite Form

(Continued from page 1186)

a full shut down, Nov. 15, but that plan was altered and the factory did not resume until Nov. 25. Various departments of the factory will be opened gradually with the idea of getting the plant into full production Jan. 1.

Hup, which had been working to capacity through the first two months of the period of depression and which went down from around 95 a day to 10, Oct. 1, started on a schedule of 25 daily, Nov. 15, and is maintaining that program.

President Hastings said reports from all section of the country indicated improved conditions and renewed confidence and expressed the opinion that a steady increase in sales would be apparent soon after Jan. 11, reaching normal around April 15.

Dodge Bros., after a record breaking performance during October and part of September, went into a two-day a week schedule three weeks ago and has outlined a program that will be continued indefinitely, which, according to unofficial reports from the plant, calls for a production of 200 cars a day, about one-third the normal output. The regular roster of Dodge employees contains about 24,000 names, but the plan, it is said, will be to continue operations with the force cut to about 5000 men.

President Percy Owen of Liberty declared this week the company had received more orders Monday and Tuesday than for any two days in several months, indicating improved conditions that presaged a steady increase until normal conditions had been restored. Liberty dealers, Owen said, were optimistic and were enthusiastic over the apparent improvement and indications that the crest of the slump had been reached and passed.

Columbia Ready to Start

The same report was made by officials of Columbia Motor Co. Columbia, like Liberty, practically has been producing no cars for several weeks but, according to W. L. Daly, general sales manager, the readjustment period has been utilized in reforming sales organizations and reshaping merchandizing policy in preparation for a resumption of demand, indicated in more cheerful reports from dealers, particularly in the West and Southwest.

Packard Motor Car Co. is continuing its efforts with the new single Six, but production on the Twin-Six virtually has ceased for a time. The normal output at the Packard plant is 750 a month, but that schedule has been cut more than half and while no definite figures can be secured unofficial but authentic information is to the effect that Packard output

is running around 300 a month with truck production cut to a point where it is dependent solely on orders.

Paige continues full time operation with reduced working force, and is producing on a schedule of about 800 a month. Paige officials are hopeful of quick resumption of buying and base that feeling on reports made by company officials who have toured the greater part of the country. Much of the Paige production is distributed in the West.

The Chevrolet plant at Flint still is operating on the 85 a day schedule, according to Sales Manager C. E. Dawson, though he admits the factory under present conditions has not reached that production point. Normal production at Chevrolet, as based on last spring, is about 550 a day. The motor and axle division still is down at Chevrolet, decreasing the employee force about 1500 but it is planned to resume operations in those departments Dec. 15.

M. A. M. A. Directors See Brighter Turn

NEW YORK, Dec. 7—A more optimistic feeling concerning the future of the automotive industry than has been apparent for some time, was manifest at the monthly meeting of the directors of the Motor and Accessory Manufacturers' Association held here last Thursday. They appeared convinced that a turn for the better in business will come with the new year.

It was reported that many makers of parts and accessories are receiving substantial orders for deliveries running from the present to the last of March and it was said many additional orders are in prospect. The parts makers do not propose to be unprepared for the resumption of business which they confidently expect. For that reason, they are making plans now for replenishing their stocks of raw material and are getting their organizations in a position to start production on a large scale when the turn for better really begins.

The parts men realize fully that unless ample provision is made for the future business now in prospect, there may be a repetition on a small scale of the conditions which prevailed last spring when manufacturers were bidding against each other for supplies. They propose to make unnecessary any period of stagnation in the industry through inability on the part of car makers to obtain materials for complete vehicles.

ALLEN DEFERS ACTION

COLUMBUS, Dec. 7—Stockholders and creditors of the Allen Motor Co. have decided to make no attempt at present to lift the receivership because of the unsettled conditions in the business world. William C. Willard and George A. Archer will continue as receivers. The company has been successful under the receivership and it is expected the stockholders will take it out of the hands of the court as soon as general conditions become more satisfactory.

Templar Decision Benefits Industry

Stock Depressing Activities Regarded as Checked—Stock Exchange Condemns Practice

NEW YORK, Dec. 6—Templar Motors Co. of Cleveland is taking full advantage of the decision of Judge Levine in the Court of Common Pleas in refusing to grant a receiver upon application of a minority stockholder. The court scathingly rebuked J. W. Wilson, who brought the action, for making the "grossest kind of accusations against a perfectly solvent firm for the purpose of creating suspicion in the minds of the public concerning its affairs."

The Templar company is running large display advertisements in which it asserts that "American business and American institutions must be protected from the unscrupulous attacks of irresponsible people."

"The application for receivership against the Templar Motors Co. and the findings of the court in this matter," it said, "proving the company to be absolutely sound and solvent, have a deeper significance than a single victory by a single organization. It is rather a victory for American business and American institutions."

The decision in the Templar case followed closely a warning issued by William H. Remick, president of the New York Stock Exchange denouncing rumormongers. He warns the members that circulation of sensational rumors will be deemed an act detrimental to the welfare of the exchange and its members and points out that there is a state law which calls for the punishment of individuals responsible for the circulation of rumors likely to depress security prices.

The automotive industry has suffered as much as any other from the circulation by professional stock gamblers of reports designed to bring down the prices of stocks so they could sell short to their own selfish advantage.

IMMEL PLANT CLOSED

COLUMBUS, Dec. 4—Robert H. Schryver, receiver for the Immel Co., body manufacturers of Columbus, which has been operated on orders booked from automobile factories, announces that the plant has been closed down indefinitely as a result of cancellation of orders. Some of the automobile concerns have asked that shipments be held up. The plant employed about one hundred men.

MUNDIE ADOPTS NEW ENGINE

PERU, ILL., Dec. 4—The Mundie Mfg. Co. has adopted the Climax model T, 5½ x 7 in. engine as standard power equipment for their No. 8 10 x 10 in. "Zin-Ho" compressor. This company has used the model K, 5 x 6½ in. Climax engine for several years in connection with three of its smaller size outfits.

Earl Resigns From Willys-Overland

Change in Policies Thought Responsible

Retirement of Vice-President Causes Wide Comment—C. B. Wilson Is Successor

TOLEDO, Dec. 7—Wide comment has been caused in the automotive industry by the resignation of Clarence A. Earl as first vice-president of the Willys-Overland Co. and virtual head of the corporation's interests in this city. He has been succeeded by Charles B. Wilson, president of the Wilson Foundry & Machine Co., Pontiac, Mich., a Willys subsidiary.

Earl was emphatic to-day in his refusal to make a statement governing the reasons for his resignation or to discuss organization affairs. It is known, however, that there have been sharp differences of opinion for the last year on matters of policy but it was supposed Earl was firmly entrenched.

It is regarded as significant that these differences of opinion seem to have grown irreconcilable since conditions arose which put the bank interests in the company in a position to dictate. It was these same interests which made Walter P. Chrysler, executive vice-president of the Willys company, chairman of the Maxwell-Chalmers reorganization, with J. R. Harbeck vice-president of the American Can Co. and also a director in many of the Willys companies, as vice-chairman.

The retirement of Earl was forecast by the recent resignation of officers and department heads who had grown up in the Earl organization and were loyal to him. It became evident some time ago that Earl expected to leave Toledo soon when his residence there was offered for sale. The home of John N. Willys was placed on the market at the same time. It is generally expected here that the affairs of Willys-Overland will be centralized in New York from now on to a greater extent than before.

Important Factor in Growth

It has been recognized everywhere in the industry that Earl is not only a production man of the first rank but a manufacturing executive of high rank. The progress of Overland in the last five years is regarded as a tribute to his ability. He joined the Willys organization after a successful career with the Hendee Mfg. Co., assuming the position of first vice-president in charge of manufacturing.

Events which developed soon after his entrance into the organization forced upon him duties outside this particular

field and his ability to become master of difficult situations quickly resulted in his becoming the nominal head of the Willys interests with general supervision over all matters save financing and policy.

When Earl went with Willys-Overland he found eighteen chassis and thirty models comprising the company's product. In resigning he leaves only two models, both of which have gained wide popularity in their particular fields. His success in handling the strike of 1918, which would have been a blow at the entire industry if it had been successful, brought him prominently before the country. That year the company showed a profit of approximately \$3,000,000 in spite of the labor difficulties which continued for eight months.

Half Year Business Broke Record

It also is regarded as significant of his ability that for the first six months of this year the company made more money than in any similar period in its history. A continuation of this showing was made impossible by the present period of depression.

Although the duties of Earl originally were confined to manufacturing it devolved on him to take the lead in building up a dealer organization and this organization to-day is admittedly one of the strongest in the country. He already has received hundreds of telegrams from dealers expressing regret.

Wilson, the new executive vice-president, took up his duties Monday but declared he could not say when the factory would resume production for the reason that he had not had time to familiarize himself with conditions. About 2,000 men are at work in the parts department which has been operated uninterruptedly except for a few days during which inventory was taken.

Wilson is highly regarded as an executive and is known as a close friend of Chrysler. While he succeeds Earl, it is believed his duties will be confined to production. He joined the Olds Motor works in 1898 and later went with the Ferro Foundry & Machine Co. He left that concern in 1914 to organize the Wilson Foundry & Machine Co. He will continue as president of the foundry company but the active management will be turned over to D. R. Wilson, his brother, now vice-president and sales manager.

No Statement at Headquarters

NEW YORK, Dec. 7—Information as to the reasons for the resignation of Clarence A. Earl as first vice-president of Willys-Overland was refused to-day at the Willys headquarters here. The only statement issued was a brief announcement signed by John N. Willys stating that Earl had resigned and that Charles B. Wilson had been named as his successor.

Schwab Not Buying Control of Stutz

Visit to Plant Not with Purchase in View—Thompson Denies Impending Changes

NEW YORK, Dec. 6—Reports that Charles M. Schwab has taken over the stock of the Stutz Motor Car Co. of America controlled by Allan A. Ryan are formally denied by the head of the Bethlehem Steel Corp. They probably originated, Schwab said, from the fact that he made a flying visit to the Indianapolis factory with Ryan but, he added, "the visit was made with no such object as purchase in view."

No announcement concerning any change in the status of Stutz affairs was made after a special meeting of the directors here late last week. Alvin Untermyer was elected a director and the regular quarterly dividend of \$1.25 a share was declared. Untermyer is a son of Samuel Untermyer, the famous attorney who has been retained by Ryan to look after his interests in the controversy with a bankers committee organized to take over his affairs as a measure of protection on loans.

William N. Thompson, president of the Stutz company, who came on here to attend the directors' meeting, issued a statement in which he said that the company was in a prosperous condition and that rumors of a change in control were without foundation.

"The vicious inspired rumors which are being circulated of an impending change in control of Stutz Motor Car Co. of America," said Thompson, "are baseless. The present management in control of the company will not be changed."

"The company is in a particularly prosperous condition and its management most satisfactory to the owners. It owes practically no money; has no fixed or other charges and has millions in free current assets."

F. A. Seaman Elected Springfield Tire Head

NEW YORK, Dec. 7—F. A. Seaman, vice-president and secretary of the Kelly-Springfield Tire & Rubber Co., was elected president at the directors' meeting to-day to succeed Van H. Cartmell, who retired because of ill health and advanced age.

Arthur Sachs of Goldman, Sachs & Co., was elected a director.

A quarterly dividend of \$1.50 a share on the 6 per cent preferred stock of the company was declared and will be paid Jan. 1.

British Plane Sale Enjoined by Court

Wrights Get Decision in Anti-Dumping Action—Patents Not Questioned

NEW YORK, Dec. 7—Federal Judge Julius Mayer has granted to the Wright Aeronautical Corporation a preliminary injunction against Handley-Page, Ltd., and the Aircraft Disposal Company, Ltd., two English corporations, and William H. Workman, their representative in the United States, restraining them from bringing to this country and selling here surplus British war planes, engines and spare parts, said to have cost \$500,000,000. In aeronautical manufacturing circles the decision was hailed as a partial victory in the anti-dumping fight.

In his decision Judge Mayer said:

"The Wright patent has been adjudicated to be valid and a pioneer of wide scope by Judge Learned Hand. . . .

"The defendants do not question these facts nor deny title, validity or infringement, but put forward the argument that the introduction of these machines will educate the American public to the utility of the airplane as a commercial proposition, hence create a large demand, hence ultimately stimulate American industry to supply that demand.

"The American manufacturer may, however, be trusted to make up his mind as to what is best for him, and his bitter opposition shows that he considers that if these machines are brought here and, as defendant Workman states, are laid down, duty and heavy transportation charges paid, in New York City—or, in fact, anywhere in the United States—at a price which is but a fraction of their actual value, such importation will destroy or gravely impair American industry in this regard.

"Defendants acquired these planes from the British Government with their eyes wide open and took their chances on their legal rights. They state that they have allotted 2,365 planes for the American market. The selling price of these planes is said to be \$6,510,000, and the defendants assert that the expense of storage and other incidentals are mounting high, and if a preliminary injunction goes against them they will lose the market and suffer great loss.

"Yet, this was their hazard. They should have known that plaintiff would move expeditiously and diligently, as it has. There are, then, no equities in favor of defendants, and they must rely on their legal rights."

Harper-Bean Subsidiary in Receivership

NEW YORK, Dec. 8—A cable despatch from London announces that a receiver has been appointed for Harper Brothers & Bean, a subsidiary of Harper-Bean, Ltd., which was formed a year ago for the manufacture of motor cars with a capital of \$6,000,000.

AIRPLANES BELIEVED SMUGGLING WHISKEY

WILMINGTON, DEL., Dec. 6—Airships, according to information received here, are being used, presumably in the transportation of liquor from one part of the country to another. Besides smuggling liquor across the Canadian border, it is said that the "whiskey ring" of Chicago has adopted the same method to distribute the stuff.

The report is believed here, in view of the fact that motor liquor trains, which came through frequently have almost entirely disappeared in this locality, except where they are carrying the stuff under legitimate permits. Now it is believed they are carrying the liquor through the air, out of the vision and reach of the officers. If this proves to be a fact, it may be necessary for the Government to send out sky police to regulate the traffic.

Territorial Limits Abolished by Ford

DETROIT, Dec. 7—Ford dealers in many sections of the country are concerned over the action of the company in abolishing territorial restrictions on the sale of Ford products, particularly in small cities and towns. While it is denied by officials of the company, there are well authenticated reports of vigorous protests being entered against the order issued last week by General Sales Manager Ryan under which it will be permissible for any dealer to solicit and sell in any territory without regard to other dealers.

Heretofore each dealer has been assigned a specific territory and protected with a commission on any car, truck or tractor sold in that territory. Territorial limits were fixed by the factory and usually were based on population although no hard and fast rule was applied. Country dealers usually were given entire counties with exclusive rights; dealers in large cities were given defined areas with full protection.

CREDITORS SUE MIDWEST

DAVENPORT, IOWA, Dec. 6—Half a dozen manufacturing and jobbing firms have filed suits against the Midwest Motor Corp. for claims aggregating \$1,200. Chief of the creditors is the Barcy-Nicholson Co., whose bills total \$414. Others are the Maremount Mfg. Co., Myles-Standish Mfg. Co., Victor Mfg. & Gasket Co., Western Felt Works and the Lockwood-Ask Motors.

ADVANCE-RUMELY TRUCK

In a recent issue we printed the specifications of the new truck of the Advance-Rumely Thresher Co., Inc. These should have included Blood Bros., universal joints.

Fort Wayne Tire Defends Integrity

Warns Stockholders of Attempt To Weaken Company—To Increase Director Board

FORT WAYNE, IND., Dec. 6—Information concerning the fact that the United States Court, sitting in Indianapolis, removed the receiver appointed by the Allen County Circuit Court of this city for the Fort Wayne Tire & Rubber Mfg. Co. is contained in a "Warning" prominently published by the company in local newspapers. The "Warning" also contains some other information relative to the company. The whole advertisement is as follows:

"This company has been informed that individuals are writing to stockholders advising them that its assets have been placed in the hands of a receiver and will soon be sold at a receiver's sale and that because of this fact at a meeting of stockholders it was determined to organize another company under the name of 'Fort Wayne Rubber Works' with a capital stock of one million dollars, \$750,000 common stock and \$250,000 preferred stock, divided into shares of \$10 each.

"This is to advise all stockholders that the receiver appointed by the Allen Circuit Court of Allen County, Indiana, was, on motion of the company, removed by the United States Court, sitting in Indianapolis, on the ground that the appointment of the receiver was improvidently made and the property was returned to the company. The representations made in the circular sent out are an attempt on the part of those who have been attempting to wreck this company, to further embarrass it, if possible.

"We further advise our stockholders that the company is in possession of its property and will operate the same and will call a special meeting of the stockholders for the purpose among others, of fully advising each and every stockholder of the exact condition and situation.

Officers Not To Vote

"Steps have been taken to increase the board of directors from five to eleven members and a special stockholders' meeting will be called for the purpose of electing the additional six directors. J. C. Brown, the company's president, and L. R. Kraft, its secretary, have voluntarily agreed that the United States District Court might enjoin them from voting their own stock at this stockholders' meeting or making any effort of any kind or character to influence or control the selection of the six new directors.

"We urgently request that each stockholder be present, if possible, at this special meeting of the stockholders and that if he cannot attend the meeting, that he so place his proxy that his stock will be voted at such meeting for such directors as, in his independent judgment, will promote and conserve the best interests of the company."

Ericsson Creditors Prepare Objections

Will Seek to Compel Company to Answer Petition—Urge Reorganization

NEW YORK, Dec. 9—The committee representing merchandise creditors of the Ericsson Mfg. Co. of Buffalo, headed by W. R. Nones, has called a general meeting of all creditors at Buffalo today to take up the affairs of the company in detail and decided upon a course of action for the future. Pending the working out of this plan and to protect the unsecured creditors, Sidney S. Meyers, general counsel of the Motor and Accessory Manufacturers' Association, appeared before Federal Judge Hazel in Buffalo and obtained a stay of twenty days within which to present answers to the involuntary petition in bankruptcy filed against the corporation.

The committee and Meyers have had conferences with the receivers, the stockholders, the bank creditors, lawyers and others at which they have studied the financial and business affairs of the Ericsson company with great care. This investigation has convinced them of the following facts in relation to it:

"That the company is apparently solvent."

"That the petition in involuntary bankruptcy (made by three creditors whose total claims aggregate about \$3,000) should be answered and stopped, although both the stockholders and the receivers have stated that they do not intend to file any answer."

"That the business and financial reorganization of the company is apparently warranted by the results of the investigation, which will presumably be verified by the facts when completely known."

"That earnest constructive operation of the company's plant and business by the Receivers in Equity is essential pending the development of reorganization plans."

"The co-ordinate and consolidated action by all the unsecured creditors is absolutely necessary to conserve and to protect the property and the creditors."

"That failure to act at this time will jeopardize the business and the good will of the company and will seriously hurt the interests of unsecured merchandise creditors."

The committee which represents a large majority in amount of the merchandise claims has urged a large attendance at the meeting and points out that unless concerted action is taken immediately the creditors are likely to suffer a severe shrinkage in the value of their claims.

ACME MAKES SPEED TRUCK

CADILLAC, MICH., Dec. 6—A new $\frac{3}{4}$ -ton speed truck assembled from well-known units is announced by the Acme Motor Truck Co. This truck is designed to meet the growing demand for lightweight delivery trucks. It is equipped with a Continental 35 hp. engine, Cotta transmission and Timken axles, and is said to be capable of a speed of 30 m.p.h. The truck uses a worm drive semi-float-

ing axle with 6 to 1 reduction, and is not in any sense a passenger car chassis converted for truck use. The frame is of pressed steel, $4\frac{1}{2}$ in. deep. Two universal joints with hollow drive shaft are fitted. Torque and drive are taken through the springs, which are $2\frac{1}{2}$ in. wide by 52 in. long in rear, and 35 in. long in front. The wheels are of the steel disk type and carry 34 x 5 in. cord tires. Electric lights and generator are included in the equipment. In appearance the truck resembles the Acme one-ton model, having the same radiator, hood, cowl and seat, and taking the same windshield and cab. The price of chassis is \$1,790 f.o.b. factory.

Du Pont Prepares to Assume New Duties

NEW YORK, Dec. 7—No announcement has been made as yet of any change in policy in the management of the General Motors Corp. under the direction of Pierre S. du Pont, who succeeded W. C. Durant as president last week. Du Pont is arranging his many other interests so that he can devote most of his time to the automotive industry, but thus far has spent only one complete day in the offices of General Motors. He is thoroughly familiar with the corporation's business in its larger aspects, but now is familiarizing himself with the details which his new position will compel him to take up. In this he will be assisted by the former president.

Durant has opened temporary offices in a Broadway building across the street from General Motors headquarters and will occupy permanent offices in the new building of the Gotham National Bank when it is completed early in the year. Durant and his family have gone South where he will rest for a fortnight longer before returning to New York. So far as can be learned, he has made no definite plans for the future and probably will not do so for the next three months. It can be said, however, that he still has large interests in General Motors and is not likely to divorce himself entirely from the affairs of that organization for some time to come.

CLARK AXLE IN PRODUCTION

BUCHANAN, MICH., Dec. 6—A motor bus axle of the internal gear type has been placed in production by the Clark Equipment Co. The first model is that for a single deck, 20-30 passenger motor bus, to be equipped with solid or pneumatic tires. All models of this bus axle will use stock parts. The design of this axle is said to provide for a low body with a minimum number of steps, insuring a low center of gravity.

BERGOUNGAN PRICES DROP

TRENTON, N. J., Dec. 3—Prices on Bergougan fabric and cord tires have been reduced effective Dec. 1. On fabrics the cut ranges from 8 to 15 per cent, and on cords from 10 to $12\frac{1}{2}$ per cent, according to size. No reductions are made in inner tubes.

Dyneto Operating on Limited Basis

Ascribes Difficulties to Slump in Farm Light Business— Position Sound

SYRACUSE, Dec. 4—The situation in the affairs of The Dyneto Co. where a creditors' committee recently was appointed by an order of United States Court, is not directly to be attributed to the slump in the automobile business, although a fair share of the company's business has been with the Franklin Automobile Co.

The complete cessation of selling of farm lighting outfits, in September, coupled with the fact that Franklin and other automobile manufacturers refused shipments at about the same time left the Dyneto company with a great surplus of stock on hand; no immediate possibility of shipment and a practically impossible collection market.

The Dyneto plant is operating, and is making limited shipments. The financial situation, according to J. D. Grant, vice-president of the company, is fundamentally substantial.

"Our affairs are not in precarious condition," Grant said. "The committee was asked for merely because we are over-inventoried. We have been doing a tremendous business here both in our automobile starter and farm lighting departments. The automobile situation broke in August but we continued with the farm light units. In September that broke even worse than the automobile situation. Since then we have been trying to effect an adjustment."

"Collections were impossible and it was useless to make shipments. As a result we held up all payments and have brought our creditors' committee into close touch with our entire situation. We have every reason to believe that our situation will return to normal within the near future."

Mr. Grant denied that the fact that Franklin had reduced prices affected the situation materially. "The Franklin company has asked us to endeavor to reduce the cost of our starters, and we are trying to do so. We are making starters for all Franklin cars now."

TO MAKE AIR-COOLED CAR

DAYTON, OHIO, Dec. 6—Research Engineering Co., incorporated about a year ago, will bring out a new air-cooled car, the engine and engineering features of which were invented and designed by O. H. Spencer, who is president of the company. Capital stock has been set at \$200,000 and a factory site is to be bought here. The building of trucks will be added later, according to plans.

ROBERT BOSCH AGENTS NAMED

NEW YORK, Dec. 4—Mazzoli & Schendel, Inc., of this city, have secured the sole selling rights for the Robert Bosch spark plugs in America.

Duryea Gets Place in National Museum

**Car Built in 1892-93 Placed on
Exhibition — Won Chicago
Race in 1895**

WASHINGTON, Dec. 7—The second gasoline automobile designed and built by Charles E. Duryea between September, 1892, and September, 1893, has been rescued from oblivion in a barn at Springfield, Mass., where it had been stored for years, and placed on exhibition in the Smithsonian Institution here. It is in good condition except for minor damage caused by rain and snow which leaked through the roof of the old barn.

The car is a duplicate of the first gasoline automobile, which was designed and built by Duryea between August, 1891, and September, 1892, except that it has a more powerful engine and correspondingly heavier and stronger parts. The car is a converted horse-drawn carriage of phaeton style.

The essential parts of the car remain very much the same as when first built. Easily loosened brass parts are gone, as is the floor carpet and cushions, the steering handle, wires, etc. Many parts are badly rusted from exposure, but the wheels and steering gear worked without hitch as the car was drawn from the freight station to the museum.

Twenty-five years ago—Thanksgiving Day, 1895—the car won the Chicago road race for motor vehicles held under the auspices of the Chicago Times-Herald. Sixty cars were entered but owing to lack of time to complete the models and the snow covered course, only six started. Two finished, the Duryea, and a Benz car entered by the Mueller Mfg. Co., Decatur, Ill.

Later the Duryea carriage was exhibited in P. T. Barnum's circus. The actual running time of the car for the fifty-five mile course was seven and a half hours, or about 7½ m. p. h. With delays for repairs which included a broken steering knuckle, the time consumed in covering the course was 10 hours, 28 minutes. The steering knuckle, was repaired at a blacksmith shop near the route.

Other entries in the race were a Benz by the De La Vergne Refrigerator Machine Co., a Roger wagon by R. H. Macy & Co., and electric wagon by Harold Sturgess, and an electrobat by Morris & Salom. Duryea had hoped to complete one of his improved models for the race, but failing to do this entered this second car of his, which up to that time, had been run several thousand miles experimentally.

INSURANCE COMPANIES UNITE

CHICAGO, Dec. 6—The National Association of Automotive Mutual Insurance Companies, made up of mutual casualty companies from all sections of the country writing one or more forms of automobile coverage, has been organized

at Chicago. One of the prime objects of the organization is to co-operate with other insurers and all available agencies in the formulation of uniform legislation for the registration of automobiles and uniform laws to prevent the theft of automobiles.

The organization will furnish its members with information regarding proposed and pending legislation affecting their business, and will advise them as to State and Federal fees and taxes, and also furnish other information of interest to companies writing automobile insurance.

Exchange May Probe Raid on Pierce-Arrow

NEW YORK, Dec. 9—Governors of the Stock Exchange are considering today a rigid investigation of a vicious bear raid yesterday on the stock of the Pierce-Arrow Motor Car Co. While the raid was in progress constructive traders declared it was time to make effective the recent warning that practices of this kind would be punished.

The only basis for the attack on the stock was an unconfirmed report that the dividend would be passed. On offerings of only about 2,000 shares there was a break at one time of 18 points and the stock closed with a net loss of 9½ points. It opened at 76 and sold down to 59, from which it rose to 68.

Pierce-Arrow officials were amazed at the assault on the stock and declared there was no basis for it. The company is in excellent position and the earnings will far more than cover the preferred dividends, with six months' business on the books.

This is not the first time in recent weeks that Pierce-Arrow has been the target for unscrupulous traders who have hammered down its stock.

NATIONAL TO INCREASE STOCK

NEW YORK, Dec. 9—Stockholders of the National Motor Car and Vehicle Corp. of Indianapolis, at a special meeting here yesterday, ratified a proposal of the directors that the capital stock be increased from 80,000 shares to 150,000 shares, of which 140,000 shares will be common of no par value and 10,000 of 8 per cent cumulative preferred of \$100 par value. The preferred stock will be sold to provide additional working capital. No further announcement was made concerning the company's plans for re-financing.

TRUCKS URGED FOR RAILROADS

WASHINGTON, Dec. 9—In an address yesterday before the National Rivers and Harbors Congress, co-ordination of highways, railways and inland waterways in the interests of efficiency and economy was urged by C. H. Markham, president of the Illinois Central Railroad. He pointed out that the essentiality of the motor truck, as a means of transportation had been recognized and suggested that railroads own and operate fleets of trucks as supplemental to rail carriers at terminals.

Overland Directors to Act on Dividend

**Lack of Quorum Causes Delay—
Banks to Carry Loans Until
Spring**

NEW YORK, Dec. 8—Directors of the Willys-Overland Co. undoubtedly will meet late this week and decide to pass the 1½ per cent dividend now due on the preferred stock. The quarterly dividend of 25 cents a share on the common was paid in October but it is not expected in January. A meeting of the directors for dividend action was called for Monday but there was no quorum present and another meeting will be called within a few days, probably this week.

Willys-Overland stockholders will not fare as well as those who own securities in the Willys Corp. for the directors of that company decided to pay in scrip the preferred dividend due Dec. 1. This was done to conserve cash assets. It is understood that the Willys Corp. is in a better position in relation to current assets than is Willys-Overland in which it owns a one-third interest. Frozen credits are the principal difficulty with Overland although there has been a severe shrinkage in its earnings because of present conditions.

The Willys-Overland Co. has a large sum outstanding in bank loans but the total is not as large as has been reported in financial circles and it is understood the banks will permit the company to carry these obligations until early next year.

Semi-official announcement was made a short time ago that the Willys-Overland Co. was seeking new financing to the amount of \$30,000,000 but the plan was abandoned after it was set in motion. It can be said on authority that there will be no financing while the market conditions remain as they are now but it is regarded as certain that permanent refinancing will be undertaken in the spring or as soon as conditions warrant. In these negotiations the management of the company will co-operate with a strong banking group with which it has close affiliations.

Expectations that the dividend would be passed resulted in a spectacular decline in Willys-Overland stock. The common dropped to 5½ and there were unconfirmed reports that banking interests recently took over at \$3 a share the holdings of a prominent stock market operator.

TO BUILD NEW OHIO CAR

WARREN, OHIO, Dec. 3—Announcement of a new corporation to build the "Western Reserve" automobile was made here this week. The personnel of the organization was not made known. The product will be a passenger car using a motor manufactured by the company. All other parts, it is reported, are made in northeastern Ohio, the territory known in Ohio history as the "western reserve."

Harvester Company Cuts Truck Output

Cancellations Cause Countermanding Order Which Was to Have Increased Production

AKRON, Dec. 4.—The International Harvester Co.'s motor truck factory has rescinded an order to increase production 20 per cent made two weeks ago and substituted another calling for a reduction in production amounting to 25 per cent below the amount which has been in effect for some time. At the office of the plant it was stated that the order to increase was countermanded and the order to decrease issued by Cyrus McCormick, Jr. of Chicago on his visit to the Akron plant a few days ago.

In this connection it was also stated, and notices to this effect have just been posted in the factory, that the night shifts have been abolished throwing out of employment 250 hands. All over-time has also been cut out and the plan of paying a bonus for good attendance has been discontinued. The plant had 2,800 names on the payroll a week ago and it is feared by some of the heads of the plant that unless a change for the better is evidenced soon the force will be cut to 2000 or less before long.

In explanation of the reason for countermanding the order for an increase in production and ordering a decrease, it was stated that orders for motor trucks which had been booked are being cancelled at a rate sufficient to warrant the new order. The plant can turn out 100 trucks a day, and less than 50 are now being made.

Harvester to Make Light Speed Truck

SPRINGFIELD, O., Dec. 4.—By the first of the year the Springfield works of the International Harvester Co. will begin the manufacture of a new type of light speed motor truck, according to announcement made at the local plant. Since the company sold its agricultural implement line here to the B. F. Avery Co., it has been devoting its energies to remodeling the big works at Lagonda, a suburb of Springfield, for the manufacture of motor trucks.

Charles H. Smart, of Milwaukee, is the new superintendent of the works. Every department of the plant is being operated now with a good sized force of men and more are being added. For the past few years the Springfield works has been making bodies for the Akron motor truck works.

RUSH FORT WAYNE PLANT

FORT WAYNE, IND., Dec. 6.—Representing Cyrus W. McCormick, Jr., president of the International Harvester Company, James D. McCann has come to Fort Wayne to superintend construction work on the big motor truck plant which the company is building in this city.

Marked headway is being made on the construction of the new factory. Temporary sidings have been laid and much building material is now on the 140 acre plant site east of the city. Large cranes to be used in the building operations have also arrived. Preparations have been made to carry on the work during the winter. The first unit of the plant will be rushed to completion so that it may be in operation early next summer.

Standards Committee Re-elects Officers

NEW YORK, Dec. 7.—At the annual meeting of the American engineering Standards Committee, Dec. 4, A. A. Stevenson, a representative of the American Society for Testing Materials, was re-elected chairman for 1921, and George C. Stone, a representative of the American Institute of Mining and Metallurgical Engineers, was re-elected vice-chairman.

The committee has recently been enlarged by the representatives of four additional member-bodies, as follows:

U. S. Department of Agriculture:

T. H. MacDonald, Chief, Bureau of Public Roads.

U. S. Department of Interior:

O. P. Hood, Chief Mechanical Engineer, Bureau of Mines.

Gas Group, consisting of:

American Gas Association.

Compressed Gas Manufacturers' Association.

International Acetylene Association.

A. Cressy Morrison, Vice-President, Compressed Gas Manufacturers' Association.

American Electric Railway Association:

(Official representative not yet designated.)

There are now forty-seven members of the committee, representing seventeen member-bodies. Twenty-four organizations in all are represented on the committee, as three of the member-bodies are groups of organizations.

ENGINEERS' CLUB TO EXPAND

BALTIMORE, Dec. 4.—A drive for increased membership—500 is the number aimed at—has been inaugurated by the Engineers Club. To induce students to join and keep young blood in the club a special low membership fee has been fixed for junior membership. New headquarters have been established in the Merchants and Manufacturers Building. Among the objects of the club are to provide an opportunity for engineers and technical men to meet each other in pleasant surroundings at centrally located club rooms, which will be open day and night, and to provide technical library facilities.

DETROIT ADDRESSES CHANGE

DETROIT, Dec. 4.—All concerns doing business in Detroit should immediately get the new street numbers of their correspondents. The new numbers go into effect on Jan. 1 and embrace many of the business as well as the residential areas of the city. Delays of two to three days will be caused in the delivery of mail by using the old numbers after the first of January.

METAL MARKETS

It is one of the anomalies of all commodity markets, but more strikingly true of the metal markets, that long before a general downward movement, such as has been recently witnessed, has run its full course, there are discernible the germs of a change in the opposite direction. While the iron and steel markets are still headed toward easier levels, there has been a decided turn in some of the non-ferrous metal markets, especially so in copper, where liquidation appears to have been completed. The greatest obstacle in the way of a more rapid alignment of the pig iron market to its correlated commodities is the snail pace at which coke prices are being demobilized. The coke operators are now playing a game of hide and seek with the blast furnace men. They are striving hard to stand pat on present prices until prices for pig iron shall have declined further. Meanwhile, however, one blast furnace after another is being blown out because of the coke operators' attitude, and the probabilities are that before long the present deadlock will be ended by the capitulation of the coke interests. In the meantime the pig iron market is so uncertain that automotive foundries refrain from placing any fresh business. Prices for finished steel products (with the exception to some extent of pipe and sheets) have reached the Steel corporation's levels, but very little business for such commodities, as finished automobile sheets is coming out at these prices for the simple reason that the majority of the automotive purchasing agents are of the opinion that before long the independents will have to shade the corporation's prices. Producers of finished steel have been given to understand that, while most of the automotive plants are in a position to defer the placing of orders until things have become more settled, price inducements would go far toward hastening the placing of such orders. Some of the smaller sheet makers are doing tall thinking on this score. While some markets, like that for pig iron, must, unless all indications deceive, adjust themselves on a still lower basis, astute purchasing agents are on the alert to detect, without too much loss in time, the psychological moment when this or that commodity will have run its full course downward and has given signs of swinging the other way.

Pig Iron—With No. 2 foundry quoted at around \$36, valley, consumers maintain a waiting attitude and cover their slight immediate wants out of the plentiful resale offerings. In the Industrial Board schedule, to which steel levels have now receded, foundry pig was set down at \$26.75, valley. This was based on \$4 coke. When coke prices recede to a sensible level consumers look for a \$20, valley, foundry market.

Steel—It may be said now that the independents are generally on the Corporation's price basis. One of the latter subsidiaries promptly met the cut of the independents in cold finished steel bars, which are now on a 3.60c., Pittsburgh, basis, a reduction of \$3 a ton. The 8c. quotation for cold rolled strip steel and the 5c. price for the hot variety, which some makers of these specialties are seeking to maintain, are strictly nominal, as resale material is offered at big concessions from these levels.

Aluminum—While the contract price of the sole American producer remains unaltered, it is understood that in sales for prompt shipment that factor is meeting the quotations in the outside market, where 98 to 99 per cent virgin ingots are offered at 25c.

Lead—The American Smelting & Refining Company's price has been lowered \$10 a ton to 5c., New York and East St. Louis. This is being shaded \$10 a ton by resellers and independents.

Bank Credits

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

NEW YORK, Dec. 9—Hopes for a continuation of the easy money of the previous week, which were based on the passing of the peak of the agricultural demands and the liquidation in the stock market, were not realized last week. A temporary check, at least, has occurred in the liquidation of both commodities and securities; and while the money market, it appears, has taken this into account, it has, apparently, also anticipated the demands of the Dec. 15 instalments on Federal income and excess profits taxes, and the interest payments due on Government war loans.

The money market was characterized by a firmer tone with less abundant offerings. Call money ranged from 6 per cent to 7 per cent, with a ruling rate of 7 per cent, as compared with 5 per cent to 7 per cent and a ruling rate of 6 per cent the previous week.

The time money market was dull, with quotations that were practically nominal. Loans on mixed collateral were quoted at $7\frac{1}{4}$ per cent for sixty and ninety days, and $6\frac{1}{2}$ per cent for four, five and six months' paper. Rates were approximately $\frac{1}{4}$ per cent higher for loans secured by all-industrial collateral.

Loans of the New York associated banks continue to decline. The week-end statement for these institutions showed a \$25,140,000 decline in loans, and a \$53,328,000 decline in total net deposits. Excess reserves over legal requirements were \$21,981,040, as compared with a deficit of \$4,085,500 the week before. Government deposits at \$8,289,000 made a low record for the whole war period.

Federal Reserve banks show a slightly less favorable technical position. The week-end statement of the New York Federal Reserve Bank showed a decline in cash reserves of \$33,697,858, and increases in total bills on hand of \$74,242,589, total earning assets \$65,193,235, and net deposits \$32,840,192.

Cash reserves of the Federal Reserve banks as a whole increased \$2,515,000 in spite of a \$1,241,000 decline in gold reserves. Federal Reserve notes in circulation declined \$13,590,000, and bills discounted secured by Government war obligations declined \$31,515,000. On the other hand, total bills on hand increased \$36,723,000, net deposits \$43,617,000, and total earning assets \$30,045,000. The ratio of gold reserves to Federal Reserve notes in circulation, after setting aside 35 per cent against net deposits, declined accordingly from 48.9 to 48.8 per cent.

INVESTIGATE TIRE PRICES

WASHINGTON, Dec. 8—Investigation by the Department of Justice of allegations that the large tire companies of the country have been involved in an unlawful agreement to control prices, is well under way and specific action in connection with it may be expected in the

near future. The utmost reticence is being maintained as to just what action is contemplated but there is reason to believe the proceedings will take their usual course. The companies into whose operations the Government has been inquiring, include Goodyear, Goodrich, Firestone, Fisk and Ajax, and others of the larger companies.

**Peru Changes Tariffs
on Automotive Products**

NEW YORK, Dec. 4—Details of the tariff changes on automobiles, trucks and tractors which went into effect in Peru on Oct. 15 are given in a new bulletin of the Bureau of Foreign and Domestic Commerce. The new rates are based on weight charges, which should be kept in mind by exporters making shipments to that country.

Power farming machines weighing less than 100 kilos, formerly admitted free, are now taxed at the rate of .10 sol per kilo. Spare parts for agricultural machines take the same rate, which doubles the previous duty, and agricultural machinery not otherwise specified—an item which apparently would cover tractors—will bear a duty of .03 sol per kilo.

Motor trucks, formerly free, will be taxed .20 sol per kilo. The former ad valorem rate on passenger cars has been changed to a weight ruling, under which the rate becomes .60 sol per kilo. The old rate ranged from 10 to 20 per cent. Motoreycles, formerly taxed at 30 per cent ad valorem, now take the same rate as automobiles. For computing these rates, the normal value of the sol is \$0.486.

MANIFOLD PLANT IN BUFFALO

BUFFALO, Dec. 4—The latest among the industries coming to Buffalo is the Tube Manifold Corp., formed in New York with \$100,000 capital. It has just taken over the Curtiss company plant. It is planned to begin operations in January with 50 employees. The company's product will be manifolds of copper, steel, brass and aluminum for automobiles, tractors, motor boats and airplanes. Louis W. Summer is president of the new company. Other officers are Albert F. Riedle, vice-president, and Charles D. Mathews, secretary and treasurer. All three of the officers have been connected with the Standard Metalware Co. of Thompsonville, Conn., which manufactures the same products.

ROCKHILL ON GOODYEAR BOARD

AKRON, O., Dec. 6—L. C. Rockhill, sales manager of the Goodyear Tire & Rubber Co., was elected to the board of directors to-day to succeed J. P. Loomis who is retiring on account of ill health. The meeting was adjourned to Dec. 23 at which time the annual statement and a statement regarding refinancing plans will be given out. A vote of confidence in the present board of directors was passed by stockholders.

INDUSTRIAL NOTES

B. & W. Rubber Co., Akron, recently organized and capitalized at \$500,000, will begin manufacturing rubber products shortly after the first of the year in a factory building now nearing completion in the eastern section of the city. The directors have elected the following officers, all Akronites: H. A. Backdorf, president; D. B. Campbell, vice-president; Eric Richards, treasurer, and Mary E. McGowan, secretary and assistant treasurer.

F. C. Sanford Mfg. Co., Bridgeport, announce that they are no longer represented in New York by Russell, Holbrook & Henderson, Inc., and request that all correspondence be addressed to the factory.

Bock Bearing Co., Toledo, has closed down until Jan. 1 because of unstable business conditions. Members of the selling force have been retained and are busy on the road.

United Automotive Body Co. has leased a warehouse in Lansing, where it will contract for work with many of the large car and truck companies. Executive offices of the company are at Springboro, Pa.

International Harvester Co. has purchased a site for a manufacturing and distributing plant in New Orleans, including dock frontage, which will be used for the manufacture of twine.

General Motors Acceptance Corp. has moved its Detroit office to the Durant Building, into which a number of other General Motors units have also moved.

WIZARD FACTORY COMPLETED

CHARLOTTE, N. C., Dec. 7—One building of the plant which will be occupied by the Wizard Automobile Co. near this city already has been completed and other structures are contemplated. The product of the concern is designed largely for export through a contract placed by the Manufacturers & Exporters' Alliance of New York. The company was incorporated early this year with a capitalization of \$1,000,000 divided equally between common and preferred stock. It takes its name from Wizard, N. C., a small town four miles west of this city where the plant is located.

The first product of the company will be the Wizard Junior, a 2-passenger roadster weighing 800 lb. with a 2-cylinder, 4-cycle, air-cooled, 15 hp. motor to sell for \$395. A detachable delivery body will be provided.

CANADA SEEKS TRACTOR TAX

WINDSOR, ONT., Dec. 6—A movement has been undertaken for the reimposition of the former tariff on farm tractors manufactured in the United States. It is designed to protect Canadian manufacturers. It is asserted by persons formerly interested in the tractor field in the Dominion that the industry was ruined when a Federal order in Council was issued in 1918 providing for free entry of all tractors valued at less than \$1,400. This is believed to be the beginning of a widespread movement to raise tariff restrictions for the protection of Canadian enterprise.

FINANCIAL NOTES

Continental Motors Corp. has cut its common dividend from 2 per cent quarterly to 1 per cent. The financial statement of the company as now being compared will show the best business the company has enjoyed both as to net profits and volume. This has been accomplished after setting up ample reserves for depreciation, taxes and contingencies.

Malbohm Motors Co. will pay a 4 per cent dividend in stock on Dec. 15. Fractions of shares will not be issued, but each stockholder whose dividend would result in a fraction of a share will receive a warrant entitling him to a full share upon payment of the difference between the fractional amount and the par value.

Lee Rubber & Tire Corp., in a balance sheet as of Sept. 30, shows total assets of \$6,642,211, a gain of \$1,046,942 over the former year. Surplus for the year is shown as \$1,039,470. The net assets applicable to the capital stock are \$5,203,061, or \$34.69 a share of no par value.

Whitney Bearing Corp., Chicago, has been incorporated with a capitalization of \$500,000 to manufacture and deal in bearings, axles, gear cases, etc. The incorporators are Julius and Harry Keller and Francis K. Busch.

Pennsylvania Rubber Co. will pay its regular quarterly dividend of 1½ per cent on its preferred stock and 1½ per cent on common stock on Dec. 15.

Ward-La France Truck Corp., a subsidiary of the American La France Fire Engine Co., Inc., has increased its capital to \$10,300,000.

Packard Motor Car Co. has declared a regular quarterly dividend of 1½ per cent payable on its preferred capital stock Dec. 15.

WOULD CONTINUE COTTA

ROCKFORD, ILL., Dec. 6—Stockholders of the Cotta Transmission Co., with factory ordinarily employing 150 men in this city, are hopeful of saving the company and have asked creditors to join with them in keeping it a going concern. Liquidation of claims is the chief hope of officials and many have agreed to this plan, realizing that attempt to force payment at this time will wreck the company.

Most of the investors are local people but only a few are manufacturers, who bought stock as an investment and are not sufficiently interested in manufacturing to take the initiative. The company was organized with \$40,000 capital stock but this was later increased to \$100,000 common stock and \$300,000 preferred.

TO REORGANIZE OHIO TIRE

PORT CLINTON, O., Dec. 7—Reorganization of the Ohio State Rubber Tire Co. is expected to follow the resignation of W. O. Bruess as president, his daughter, Miss Stella Bruess as treasurer and H. S. Ballard of Columbus as secretary. Their action followed complaints of stockholders against the management. The retiring officers have surrendered all the stock they hold in the company against which judgments amounting to more than \$20,000 have

been taken. It is expected that a new board of directors will be elected and that they will be able to reopen the plant which has been closed for some time. The assets of the company are said to be approximately \$700,000 while the liabilities are only about \$150,000.

Fisher Body Assets
Drop in Six Months

DETROIT, Dec. 6—The balance sheet of the Fisher Body Co. on Oct. 31 compared as follows with that of April 30:

Assets—	Oct. 31, '20	Apr. 30, '20
Ld., bldgs., etc.....	\$21,706,284	\$17,991,201
Gdw., pat., etc.....	2,373,080	1,473,819
Inv. & adv. to affil. cos.....	678,901	1,993,914
Chevrolet Mot. notes.....	4,000,000	4,000,000
Skg. fd.....	62,065	47,712
Chevrolet Mot. notes.....	4,840,000	13,840,000
Current Assets—		
Drfd. Chgs.....	743,110	820,353
Prpd. txs., etc.....	317,848	396,871
Inventories.....	22,104,217	18,119,615
Accts. & notes rec.....	8,894,941	5,069,988
Investments.....	1,579,099	1,570,600
Cash.....	2,981,404	7,004,731
	\$70,780,949	\$72,328,804
Liabilities—		
Prof. stock.....	\$3,642,500	\$4,213,500
Com. stock.....	29,711,825	29,711,825
Pfd. stk. of N. Plate Gl. Co.....	900,000	900,000
Deb., etc.....	9,924,000	9,829,000
Current Liabilities—		
Notes pay.....	1,520,000	
Bank loans.....	7,790,000	13,560,000
Accts. pay.....	4,492,855	5,130,370
Prov. for txs.....	2,908,355	1,867,986
Reserves.....	1,508,059	721,484
Surplus.....	8,483,855	6,395,139
	\$70,780,949	\$72,328,804

On Oct. 31, 1920, the net tangible assets applicable to the common stock amounted to \$35,822,100 or \$72 per share of no par value.

Dunkirk Axle Succeeds
Empire Axle Company

DUNKIRK, N. Y., Dec. 7—The Dunkirk Axle Corp. has been formed to succeed the Empire Axle Co. which filed a petition in bankruptcy a few months ago. It has taken over the assets of the Empire company and will continue the manufacture of axles. The officers of the company are: President, A. A. Keesler; vice-president, and general manager, James A. Young; Secretary-treasurer, William H. Poat. The property of the axle company was bought at receivers' sale by Young.

The interests now in control of the Dunkirk Axle Corp. are the same as those which control the Watson Products Corp. of Canastota. They owned the controlling interest in the Empire Axle Co. and were instrumental in the formation of the new corporation.

RECEIVERS MADE PERMANENT

NEWARK, N. J., Dec. 6—Receiverships in the cases of the Stanwood Rubber Co. of Elizabeth and the Hardman Rubber Co. of New Brunswick have been made permanent by Vice-Chancellor Backes. The bond of Edward A. Hayes, receiver for the Hardman company, has been fixed at \$20,000; that of John Kirkpatrick, receiver for Stanwood, at \$50,000. The plan to combine the two companies still is under consideration.

MEN OF THE INDUSTRY

Joseph C. Weston has been elected president and general manager of the Ajax Rubber Co., Inc., by the directors of the company. Weston came with Ajax as vice-president a year and a half ago from the United States Rubber Co., with which organization and its subsidiaries he had been connected as an executive for twenty years. He has been a leading figure in the tire industry for many years.

W. V. Logan, formerly manager of pneumatic truck tire sales of the United States Tire Co., has been named manager of distributor sales, with full charge of the sale of distributor brands. C. K. Whidden, formerly manager of solid tire sales, has been made manager of truck tire sales.

George W. Hewitt, secretary-treasurer of the Duplex Truck Co., resigned from that organization and is succeeded by Andrew Langenbacher. Hewitt had been with the organization for four years and previous to that with R. M. Owen Co., Lansing distributors of Reo cars and trucks.

M. M. Fernandez, special representative of the export department of the Nordyke & Marmon Co., will leave on an extended business trip to Mexico, the West Indies and South America. Fernandez was formerly with the John N. Willys Export Corp. of New York.

James C. Armstrong, formerly designing engineer with Fairbanks, Morse & Co., Beloit, Wis., is organizing a company in that city to manufacture a fuel-saving manifold for Ford and other cars. It is to be known as the James C. Armstrong Co. and will be incorporated under Delaware laws.

J. C. Kopf, formerly manager of the engineering department of the Duff Mfg. Co., has been appointed research engineer and placed in charge of a newly established research department. F. W. Schwerin has been promoted to manager of engineering.

J. W. Kerr, for the past seven years South American representative of the Firestone Tire & Rubber Co. has become associated as a partner in the firm of Watson & Co., Buenos Aires and Rosario, Argentina, Ford representatives.

T. B. O'Neill, for thirteen years purchasing agent for the Martin-Evans Co., Brooklyn, has been promoted to sales manager for the company and has been succeeded in his former position by A. Celler.

J. H. Shoemaker, formerly general service manager for the Ericsson Mfg. Co., Buffalo, has resigned to assume the position of sales and service manager of the Southern Electric Service Co., Memphis, Tenn.

Charles Melhado, who has been in charge of export sales for the Bethlehem Motors Corp., has been appointed domestic sales manager; also succeeding in this department Roy S. Davey, who resigned.

Samuel C. Harvey, formerly sales manager of the Indiana Motor Truck Co., has been appointed general sales manager of the H. J. Koehler Motors Corp., Bloomfield, N. J.

Clayton R. Burt has been appointed general manager of the Willys-Overland Co., Ltd. He was formerly assistant general manager of the Russell Motor Car Co., Ltd.

Robert T. Walsh has accepted the position of advertising manager and assistant sales manager of the Apex Motor Corp., Ypsilanti, Mich., manufacturers of the ACE car.

Calendar

SHOWS

- Dec. 10-18—New York. Motor Boat Show. Grand Central Palace.
- Dec. 11-20—Los Angeles. Annual Automobile Show. Los Angeles Motor Car Dealers' Ass'n.
- Dec. 18-24—New Orleans. Annual Automobile Show. New Orleans Automobile Dealers Ass'n, Abbott Bldg.
- Jan. 3-8—New York. Motor Truck Show. Motor Truck Ass'n of America, Twelfth Regiment Armory.
- Jan. 8-15—New York. National Passenger Car Show. Grand Central Palace. Auspices of N.A.C.C.
- Jan. 10-17—Portland, Ore., Annual Automobile Show. Automobile Dealers' Ass'n. Municipal Auditorium, M. O. Wilkins, Mgr.
- Jan. 15-23—Philadelphia. Annual Automobile Show. Philadelphia Automobile Trade Ass'n.
- Jan. 17-23—Milwaukee. Annual Automobile Show. Milwaukee Automotive Dealers' Ass'n.
- Jan. 22-27—San Francisco. Second Annual Pacific Coast Automotive Equipment Exposition. Auditorium.
- Jan. 22-29—Baltimore. Annual Automobile Show. Baltimore, Automobile Dealers' Ass'n, 5th Regiment Armory, J. C. O'Brien, Mgr.
- Jan. 22-29—Cleveland. Annual Passenger Car Show. Cleveland Mfr's & Dealers' Ass'n, Wignmore Coliseum.
- Jan. 22-29—Montreal. Annual Automobile Show. Montreal Automobile Trade Ass'n, Motordrome Bldg.
- Jan. 29-Feb. 4—Chicago. National Passenger Car Show. Coliseum. Auspices of N.A.C.C.
- Feb. 5-12—Minneapolis. Annual Automobile Show. Minneapolis Automobile Trade Ass'n.
- Feb. 6-12—Columbus. National Tractor Show. Columbus Tractor & Implement Club, Ohio State Fair Grounds.
- Feb. 12-19—Hartford, Conn., Annual Automobile Show. Hartford Automobile Dealers Ass'n. Armory, Arthur Fifoot, Mgr.
- Feb. 12-19—Kansas City. Annual Automobile Show. Kansas City Motor Car Dealers' Ass'n.
- Feb. 14-19—St. Louis. Annual Automobile Show. St. Louis Automobile Mfr's & Dealers' Ass'n, Robt. E. Lee, Mgr.
- Feb. 14-19—Winnipeg. Western Canada Automotive Equipment Show.
- Feb. 18-28—San Bernardino, Cal., National Orange Show. Fred M. Renfro, Mgr.
- Feb. 19-28—San Francisco. Fifth Annual Pacific Automobile Show. Exposition Auditor-

ium, George Mahlgreen, Mgr.

Feb. 21-26—Louisville. Annual Automobile Show. Louisville Automobile Dealers Ass'n, First Regiment Armory, C. L. Alderson, sec'y.

Mar. 2-10—Des Moines. Annual Automobile Show. Coliseum, C. G. Van Vliet, Mgr.

Mar. 5-12—Brooklyn. Annual Automobile Show. Brooklyn Motor Vehicle Dealers Ass'n, 23d Regiment Armory, George C. Lewis, chairman.

Mar. 7-12—Syracuse, N. Y. Annual Automobile Show. Syracuse Automobile Dealers Ass'n, Armory, Howard H. Smith, Mgr.

Mar. 7-12—Indianapolis. Annual Automobile Show. Indianapolis Automotive Trade Ass'n, Automobile Bldg., State Fair Grounds, John Orman, Mgr.

Mar. 12-19—Boston. Annual Automobile Show. Mechanics Bldg. and South Armory.

Mar. 14-19—Omaha. Annual Automobile Show. Omaha Automobile Trade Ass'n, Inc., Omaha Auditorium, C. G. Powell, Mgr.

April 4-9—Seattle. Annual Automobile Show. Seattle Motor Car Dealers' Ass'n, Arena Hippodrome.

April—Chattanooga, Tenn., Spring Automobile Show.

Chattanooga Automotive Trade Ass'n, Sunday Tabernacle, C. A. Noona, sec'y.

FOREIGN SHOWS

Jan. 7—Sydney, Australian Motor Show.

Jan. 22-29—Colombo, Ceylon Motor Show.

Feb. 7—Delhi, India, Delhi Motor Show.

Mar. 23-28—Witwatersrand Agricultural Show including machinery and motors sections.

CONVENTIONS

Dec. 13—Washington, Convention of American Association of State Highway Officials.

Dec. 28-30—Chicago. Annual Meeting American Society of Agricultural Engineers.

Jan. 7—New York. Advertising Managers Council, Motor & Accessory Manufacturers Ass'n.

Jan. 11-13—S. A. E. Annual Meeting, New York City.

Feb. 2-4—Chicago. First Annual Meeting, Automotive Electric Service Assn. Hotel La Salle.

May 4-7—Cleveland, National Foreign Trade Council.

Oct. 12-14, 1921—Chicago. Twenty-Eighth Annual Convention National Implement & Vehicle Ass'n.

Cleveland Opens Fight on Car Theft Schools

CLEVELAND, Dec. 4—Alarmed by the fact that in the last three years automobiles worth \$3,500,000 have been stolen in this city alone, and that in the present year 1,894 cars have been stolen, the Cleveland Automobile Manufacturers' & Dealers' Association have undertaken to break up and smash a ring of thieves, which, it is said, has been uncovered here.

George K. Wadsworth, president of the commercial car dealers association, said a determined effort was being made to make it absolutely safe for a man to own a car in Cleveland. He declared that dealers and manufacturers are going to see the thing through and are going to rout the auto thieves. F. E. Stuyvesant, president of the passenger car dealers organization, made a like statement.

GERMANY TO ASSEMBLE FORDSON

DETROIT, Dec. 7—Preliminary plans have been made by Henry Ford for the introduction of his tractors into Germany. This will be made possible through an arrangement with the German firm of Ehrlich & Graetz, manufacturers of lighting fixtures. Graetz recently returned to Germany after a conference with the Fords. The business will be set in motion by the shipment of a small number of complete tractors to Germany. If no objection is raised to their entry into the country, other shipments will follow. When the business is

established, it is expected that all the parts except the motors will be manufactured in Germany. The Teutonic territory is said to offer a potential market for tractors and the German backers of the enterprise predict that a large trade can be developed.

Lecturers Pick Topics for Tractor Exhibit

COLUMBUS, Dec. 3—The committee in charge of the coming National Tractor Show, which will be held at Columbus, Feb. 6 to 12 inclusive, has arranged in part a program of lectures on tractors and power machinery. Some of the principal speakers will be J. B. Davidson of Iowa State College, who will speak on "The Modern Trend of Tractor Designs"; Prof. G. W. McCuen of Ohio State University, "Some Lessons from a Tractor Survey of Ohio"; Prof. William Aikenhead of Purdue University, "Tractor and Belt Power," and Prof. R. U. Blasingame of Pennsylvania State College, "Should a Tractor or Tractor Tools Be Purchased by Community Groups?"

In addition mass meetings will be held at 4 P. M. on certain evenings when more popular subjects will be treated by men of national prominence. Among the number will be Secretary of Agriculture Meredith. Contracts for space in the show are coming in and there is not a cancellation, despite the unsettled business conditions. About three-fourths of the available space has been sold.

Manitoba to Boost Business with Show

WASHINGTON, Dec. 4—A review of the automobile industry in the province of Manitoba prepared for the Department of Commerce here by the American vice-consul at Winnipeg shows that every effort is being made to push sales. The Western Canada Automobile Show will be held in the Board of Trade Building Feb. 14-19 and about eighty dealers are expected to exhibit cars and accessories.

The show will be financed by the sale of space. Winnipeg is the western distributing center for American cars and the initial show is expected to boom business throughout the province. W. L. Williams, chairman of the executive committee, has announced that all applications for space must be filed by Dec. 15.

Dealers in Winnipeg anticipate heavy truck sales as a result of the example set by the municipal authorities in asking for an appropriation to purchase ten new trailers. The equipment will cost about \$30,000 and effect a saving of 20 to 30 per cent in the operation of the department. British truck manufacturers have opened two agencies in Winnipeg and are advertising their goods extensively.

The provincial license department states that 85,117 automobile licenses and 1059 motorcycle tags were issued this year with a revenue of \$396,505. Anti-theft legislation is being prepared.

AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

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No. 25

Railroad Officials Recognize Truck as Transportation Ally

Trucks are needed to supplement railroads, asserts Daniel Willard. Chief Engineer of Rock Island predicts that truck lines will supersede branch railways.

A SWEEPING endorsement of automotive vehicles as transportation units was heard last week by the members of the Society of Mechanical Engineers at the annual meeting in this city. This endorsement could not have been better developed than it was, had this been the express object of the meeting. It all came about in the transportation sectional meeting.

First, Daniel Willard, president of the Baltimore & Ohio Railroad, declared that, while automotive vehicles could not compete with the railroads in long hauls, that they should be used for transportation in short haul traffic and in sparsely settled communities.

Second, Charles A. Morse, chief engineer of the Chicago, Rock Island & Pacific Railroad, told from the engineers' viewpoint how automotive vehicles should be used by the railroads as feeders.

Third, Francis W. Davis, consulting engineer of the truck department of the Pierce-Arrow Motor Car Co., and chairman of the Committee on the Science of Truck Operation of the Society of Automotive Engineers and that society's representative on the Automotive Conference Committee of the National Highway Educational Conference, read an illuminative paper on truck operation as it affects the public.

Willard's reference to the truck was brief, but it contained a message that the automotive industry will be very pleased to hear. It presented a railroad official's view that the motor truck is certain to become the ally of the railroad and that the two means of transportation will reach their best efficiency by

working together. The best use of the two transportation agents does not conflict, according to Willard.

This is an especially strong endorsement, as Willard is considered as representing the best thought among the higher railroad authorities.

Morse presented a more intimate picture of the same viewpoint, as he went into considerable detail. Roughly speaking, the picture he drew was that of a railroad running through an agricultural region and serving a strip of territory about 100 miles wide, the truck lines radiating fanlike from this railroad to gather the materials to be shipped on the railroads to the warehouse or marketing center. An extract from this presentation follows:

Why Duplicate Lines?

"The public is paying for the good roads, they own the automobiles and motor cars, and now, under the Transportation Act, they must pay for the maintenance and operation, and also the interest on the value of the branch lines of railroads. In many localities the passenger travel on the railroads, especially on slow branch line trains, has been reduced 50 per cent to 75 per cent, due to the automobile.

"The public are going to be required to pay heavy taxes to cover cost of construction and upkeep of their good roads. Why should they, in addition to this, be obliged to pay in railroad rates the cost of upkeep, operation and interest on the cost of a branch line of railroad which they do not need, as with a good hard surfaced road and no branch line of rail-

road, some one would operate a motor bus for passengers and motor express for less than carload freight?

"A careful study should be made of branch lines of railroads, and where there are 'good roads' of the hard surfaced class, over which the business now handled by the railroad can be handled by motor trucks and buses, the matter of dismantling the branch line of railroad should be given serious consideration.

"The cost per ton-mile for transporting freight and the cost per passenger-mile on the short branch lines, are far more than the amount received by the railroad, the result being that the revenue from main line business must be enough to pay for its cost, and, in addition, must cover the deficit on the operation of the branch lines.

"If many of these lines that are tributary to a territory within the limits of motor bus and motor truck service could be taken up and abandoned, it would mean a reduction in the cost of main line service. Every large railroad has many branches of this kind which are simply feeders, and do not reach any large towns or connect with any other railroad, which could be taken up with economy to the public.

The Rate Problem

"Where branch lines are so long that they can not be replaced with motor service, and do not connect with or cross other railroads, there should be a rate on the branch that would yield an amount sufficient to cover cost of upkeep and operation, and to pay the required return on the value of the line, as by this means the main line rates could be reduced. There is no reason why the public at large should be required to pay an increased rate to provide cheap rates, cheaper than cost to produce, on a branch line to accommodate a few people. This is discrimination against the many in favor of the few, but it is one of the things that has been going on in this country for years.

"In considering the question of abandoning a branch line, the first question that comes to the mind of the railroad man is, how about the capital charge? Capital account would have to be credited with the book value of the line abandoned, and operation charged with the same, less salvage; but this could be saved in direct outlay in a period of about five years, and should be distributed over such a period.

"Branch lines are a necessity, and it should not be understood that any attempt is being made to belittle their importance; but the transformation that is constantly going on in large cities in connection with suburban train service, by which stations near the center of the city are abandoned, due to rapid transit on elevated railroads or subways, furnishing as good or better facilities, is also taking place where short branch lines are being operated, where the business can be taken care of as well, if not better, by motor cars on hard surfaced wagon roads."

Need of a Change

An interesting feature of Morse's paper was his discussion of the present status of the branch line. This line, he said, was built to carry much lighter equipment than the main lines and was supplied with power and rolling stock from the obsolete material, usually from the older units. This small material was now about worn out and the railroads are confronted with the problem either of rebuilding the branch lines to carry heavier units of rolling stock or of building lighter units especially for use on the branch lines. Either necessity would mean the employment of much capital that the railroads can ill afford to apply in this direction.

Davis, in discussing the "field of truck transportation," said that there are so many conditions affecting the cost of transportation of freight that he would not attempt to define the mileage that should be considered the dividing line between railroad and truck transportation. He presented two tables of cost, one based upon door-to-door delivery from Buffalo to nearby and more remote cities, and the other on similar costs from various shipping points to New York City. In these tables, reproduced herewith, the relative cost and time of delivery as between the two methods of handling freight can be found.

COMPARISON OF THE COST OF DOOR-TO-DOOR DELIVERY OF FIRST-CLASS L. C. L. FREIGHT

Table I—From Buffalo to various points.

Buffalo to	Miles	Flat freight rate	*Total cost by rail per 100-lb.	Time by freight days	†Truck rate per 100-lb.	†Time by truck hours
Tonawanda	10	\$0.25	\$0.83	2	\$0.25	2
Niagara Falls	26	0.28	0.87	2	0.35	4
Batavia	37	0.31	0.90	2	0.60	5
Rochester	72	0.38	0.99	3	0.80	9
Jamestown	77	0.54	1.17	2	0.90	9
Erle	92	0.59	1.23	2	1.00	10
Ashtabula	129	0.67	1.32	3	1.30	14
Elmira	145	0.61	1.25	4	1.40	15
Syracuse	154	0.56	1.20	2	1.50	16
Utica	203	0.66	1.31	3	2.00	21
Binghamton	204	0.70	1.36	3	2.00	21
Pittsburgh	241	0.84	1.52	5	2.50	26
Albany	308	0.72	1.38	4	3.00	31

Table II—From various points to New York City.

To New York City from	Miles	Flat freight rate	*Total cost by rail per 100-lb.	Time by freight days	†Truck rate per 100-lb.	†Time by truck hours
New Rochelle, N. Y. ...	17	\$0.42	\$1.03	1	\$0.25	3
Stamford, Conn. ...	31	0.48	1.10	1	0.60	4½
Bridgeport, Conn. ...	51	0.56	1.20	2	0.75	7
New Haven, Conn. ...	74	0.59	1.23	2	0.80	8½
Hartford, Conn. ...	109	0.63	1.28	5	1.10	12
New London, Conn. ...	127	0.70	1.36	5	1.30	14
Springfield, Mass. ...	150	0.63	1.28	7	1.50	16
Providence, R. I. ...	185	0.74	1.41	4	1.90	20
Gloucester, Mass. ...	201	0.85	1.54	7	2.00	21
Fall River, Mass. ...	220	0.74	1.41	5	2.20	23
Boston, Mass. ...	233	0.74	1.41	4	2.40	25
Lowell, Mass. ...	259	0.79	1.46	7	2.60	27

*Total cost by rail per 100-lb. equals freight rates plus teaming charges both ends (\$0.30) plus cost of extra boxing (\$0.24) plus extra freight charges on increased weight of boxing (17 per cent of freight rate.)

†Trucking Association figures (1920).
‡Loading and unloading time of 1 hr. plus running time at 10 m.p.h.

In his discussion of the field awaiting the bus, Davis took the position that the future of the passenger traffic of the automotive vehicle is as an ally of the track systems of the cities, and not as a means of replacing subways, elevated and electric roads. His statement in this regard was similar to that of George M. Graham, who was spokesman for the automotive industry at the recent convention of the Electrical Transportation Association.

The Possibilities

As to the present status of the truck transportation, Davis said that there are 260,000 miles of railways and 2,500,000 miles of highways in this country. Of the latter practically 300,000 miles are classed as surface roads, but the total figure indicates the possibilities. He estimated the present number of trucks at 800,000 and said that if each hauls five tons of freight daily, the total for the year would be close to a billion and a quarter tons. The railroads in 1918 hauled 2,504,000,000 tons of freight.

Davis said that so many conditions enter into the costs of truck transportation that the actual cost in the average case cannot be given. The present need is for a standardized cost system for such transportation.

The greatest single item of improvement in truck transportation has been development of the ability of a truck to make its way over hills and poor roads. He then told

of the work being done by the Educational Conference on Highway Engineering and Highway Transport Engineering for the development of men competent to handle the transport of the future.

In closing Davis presented the following conclusions:

"Railway transportation should and will hold its place for long hauls, and for carload shipments where there is direct railway connection to the factory or warehouse of the shipper.

"Motor transportation will relieve the railroads of the expensive short haul, serve them at terminals and widen the zone tributary to railroads throughout their entire length.

"It will supplement the street railways.

"It will spread into a wide field where the engine power can be utilized for auxiliary purposes.

"With the steady improvement of devices for shortening the loading and unloading time there will be a reduction in the use of horses for heavy freight haulage.

"The economic limit of the size of motor trucks will probably remain about as at present, although the use of trailers will increase the tons hauled per movement.

"The use of motor trucks will increase with the general improvement of the highways.

"The motor industry will welcome sound and uniform legislation and aid in securing it."

Operating Railway Cars with Gasoline Engines

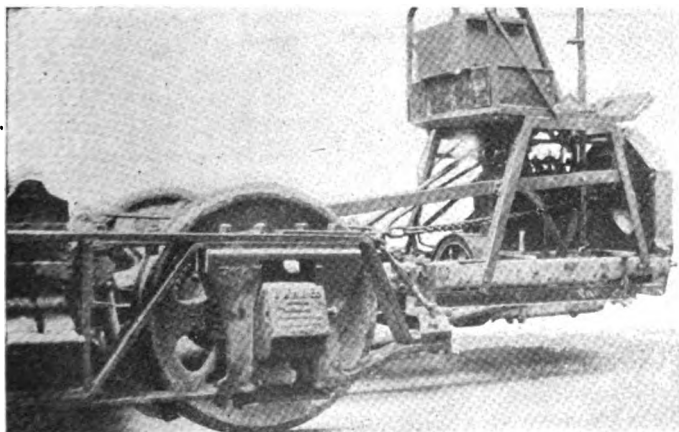
THE operation of short-line railways in which steam locomotives are employed for handling both freight and passenger traffic has often proved an unprofitable enterprise. This has been especially true during the past few years, when operating costs advanced rapidly, due in part to State and other regulations requiring a full crew on all trains. For this reason many efforts have been made to substitute gasoline propelled vehicles for the steam locomotive. In many instances ordinary motor trucks have been equipped with steel wheels, for running on rails, and passenger-carrying bodies, and these vehicles have in some cases been used to haul freight cars, especially where the grades are not heavy, and the tractive effort required is consequently small. In one instance which has come to our attention, trucks using both solid rubber tires and steel flanged wheels have been employed. The steel wheels were used when the truck ran on the rail and the rubber tires, which were of larger diameter and overhung with rails at the outside, were used when the vehicle was required to run on the ordinary road to pick up or discharge freight. This rendered door-to-door delivery possible and enabled the operation of a road which had previously been abandoned because of the high cost of operation with steam equipment.

Donald A. Hampson has recently sent us particulars concerning another application of the gasoline engine to railway use. In this case a car previously used for electric railway service was employed. One of the trucks of this car was fitted with a $4\frac{3}{4} \times 5\frac{1}{2}$ in. 4-cylinder automobile engine, driving through a cone clutch to a gearset, and then through a jackshaft and double chain

final drive to the front axle of the truck. This assembly is shown in the accompanying photograph. The wheels of the truck are 33 in. in diameter. No differential is used in the jackshaft, the latter passing directly through the master gears. The total gear reduction, engine to axle, is 5.7 on high and 14.6 on low and reverse, with an intermediate speed between. This arrangement permits a reverse speed of 12 m.p.h. without undue racing of the engine, and overcomes what is said to have been a drawback in the adaptation of existing automotive equipment to railroad use, namely, the slow speed at which backing and general yard movement can be made with the ordinary transmission and gear ratio. Driving on one axle of the truck only is said to be practical so long as the weight on wheels is, as in this case, several times the maximum tractive effort obtainable.

The weight of the car, as equipped, was 25,000 lb., the rear truck alone weighing 7000 lb. and the power truck 8100 lb. Since each truck carries one-half the weight of the car body, the total weight on the power truck was approximately 13,000 lb., of which about 8000 lb. is carried on the forward driving wheels. The car, as equipped, has negotiated a 6 per cent grade, and in trial tests had no difficulty in moving a 28-ton interurban electric car from rest, without slipping the driving wheel, and getting into second gear within 40 ft. Thus, when used as a tractor, this truck moved seven times its own weight. Mr. Hampson estimates the tractive effort required to accomplish this as between 700 and 800 lb. Speeds of approximately 30 m.p.h. have been obtained.

The car used is 30 ft. long, exclusive of platforms, and has longitudinal seats accommodating about 40 passengers. It was not intended for year-round use, but for service during the seven months of the year, when passenger traffic is heavy. The purpose was to stimulate traffic by giving more frequent service at lower cost than is economically possible with steam trains. As shown in the photograph, the operator's seat is above the engine, the powerplant having been left intact exactly as arranged in the automobile frame. When the truck is in place the driver sits in approximately the same position ordinarily occupied by the motorman, the radiator coming at a point approximately flush with the front end of the car.



Truck of rebuilt street car driven by automobile engine

THE German aerial services connecting Amsterdam, Bremen, Hamburg and Copenhagen and Berlin, Warnemunde, Malmoe and Copenhagen have been suspended for the winter. The present intention is to resume these services in March next. The service between Berlin and Bremen is to be maintained during the winter.

Friction Drive Revived in New Kelsey Six-Cylinder Car

Friction disk and wheel are located within rear axle housing, which is of aluminum alloy and is said to be lighter than standard type. Jackshaft carries helical pinion meshing with internal gear on wheel hub, giving 4.5 to 1 reduction. Wheelbase is 116 in. Engine $3\frac{1}{8} \times 4\frac{1}{4}$ in. Falls.

THERE have always been some staunch supporters of the friction drive for automobiles, among both technical and commercial men. Most of these have had some connection with one of the two or three firms which in the past have produced friction driven passenger cars in considerable number and know exactly where the weaknesses of these cars lay. They are of the belief that these weaknesses can be eliminated and that the inherent virtues of the drive make it superior to the positive gear transmission.

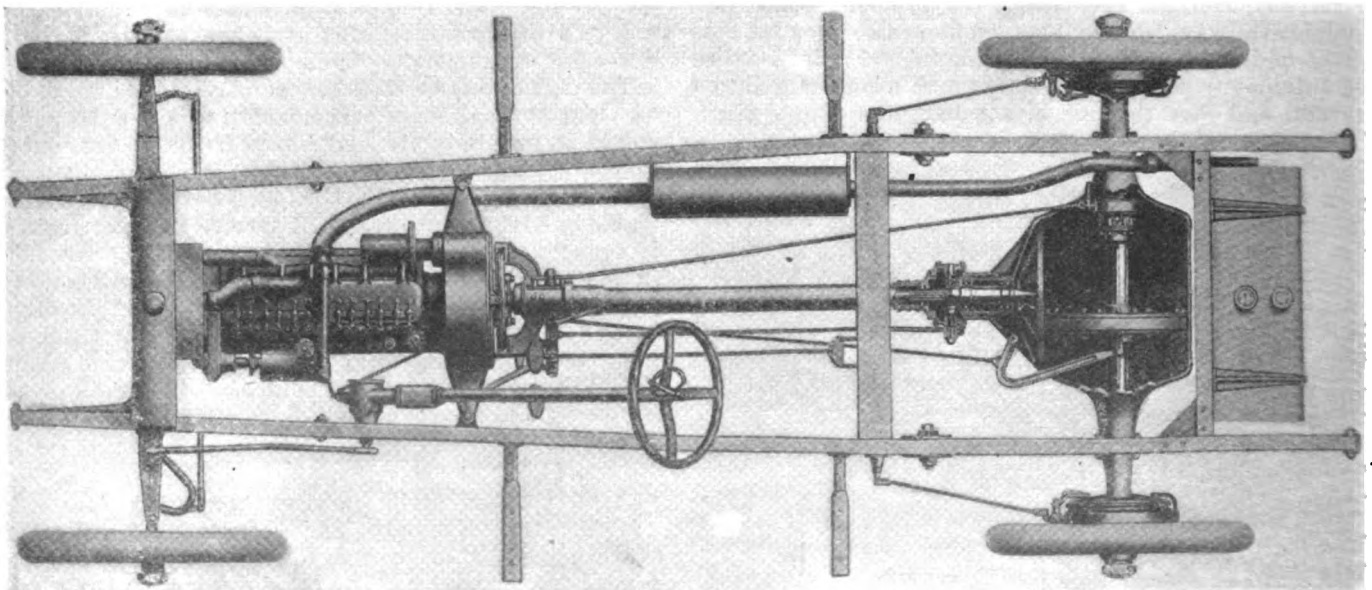
The chief advantage of the friction drive is that it permits of a large number of varying reductions with a very simple mechanism. In one respect the number of different reductions obtainable is infinite, but as the lever by which the friction wheel is slid across the face of the disk is held in position by a latch engaging in slots on a sector, the number of ratios available for regular driving is limited, though greater than on gear-driven cars. Then there is the elimination of shocks to the mechanism due to "grabbing" of the clutch, and a further important advantage resides in the noiseless operation at all speeds.

One of the friction drive enthusiasts is C. W. Kelsey, who many years ago was connected with the old Maxwell-Briscoe Co. at Tarrytown, N. Y. Mr. Kelsey took up the development of a friction driven car seven years ago and was about ready to begin production when the war interfered with his plans. He has now completed designs for a six-cylinder car and has opened a plant in which production has been begun.

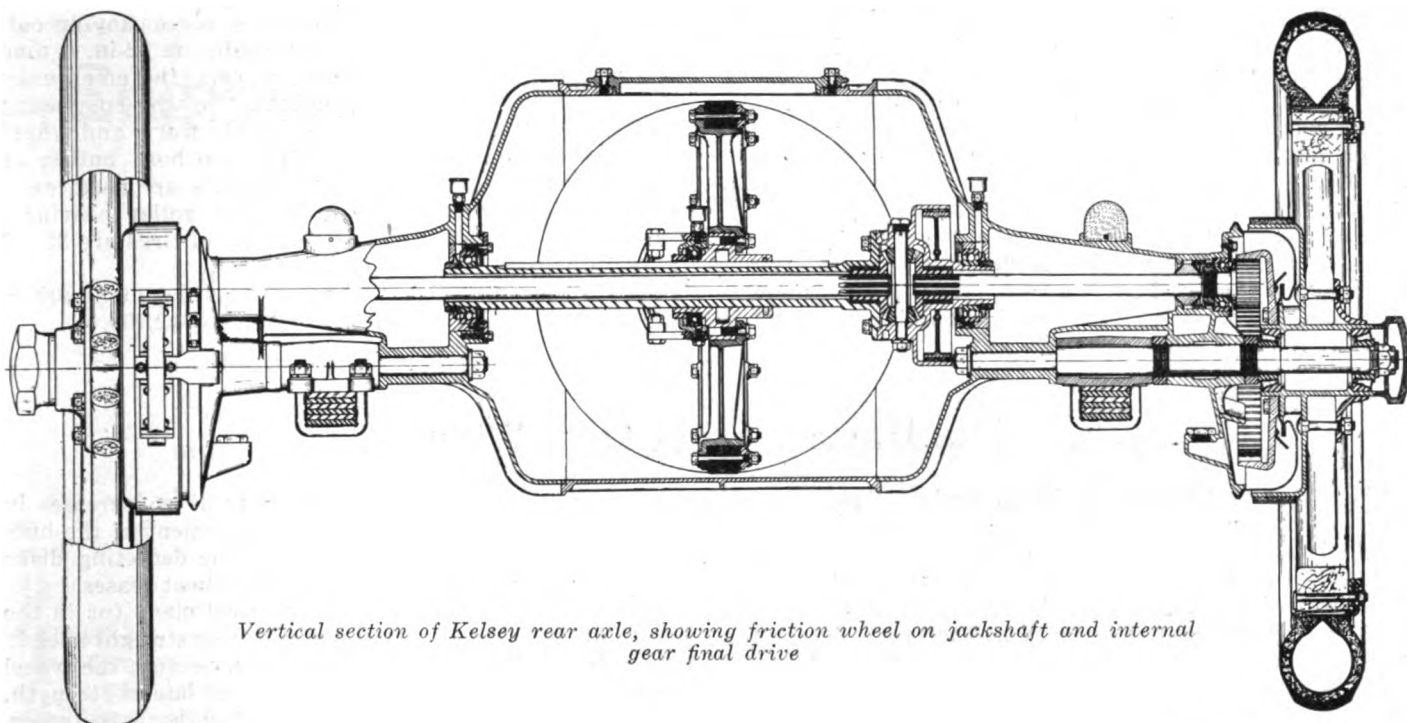
In the Kelsey car the chain transmission, which was a feature of all previous friction driven cars and no doubt was one of the causes of their unpopularity, has been dispensed with. There is a shaft drive from the rear end of the engine crankshaft to the friction disk enclosed in the central housing of the rear axle. This shaft connects to the crankshaft through a fabric disk joint and is surrounded by a steel tube which takes the torque reaction of the final drive. At the rear end the shaft is splined for driving connection with the short shaft carrying the friction disk which must be slid back and forth to engage it with and disengage it from the friction wheel. The torque tube surrounding the propeller shaft is provided at its forward end with a swiveling fork which is hinged to the flywheel housing, so that the flexible joint is not subjected to the stress of torque and brake reaction.

The propeller shaft is supported on ball bearings at both ends. Lubrication of the forward bearing is effected by grease cups, while the rear bearing is contained in a casing provided with a plug through which lubricant can be injected.

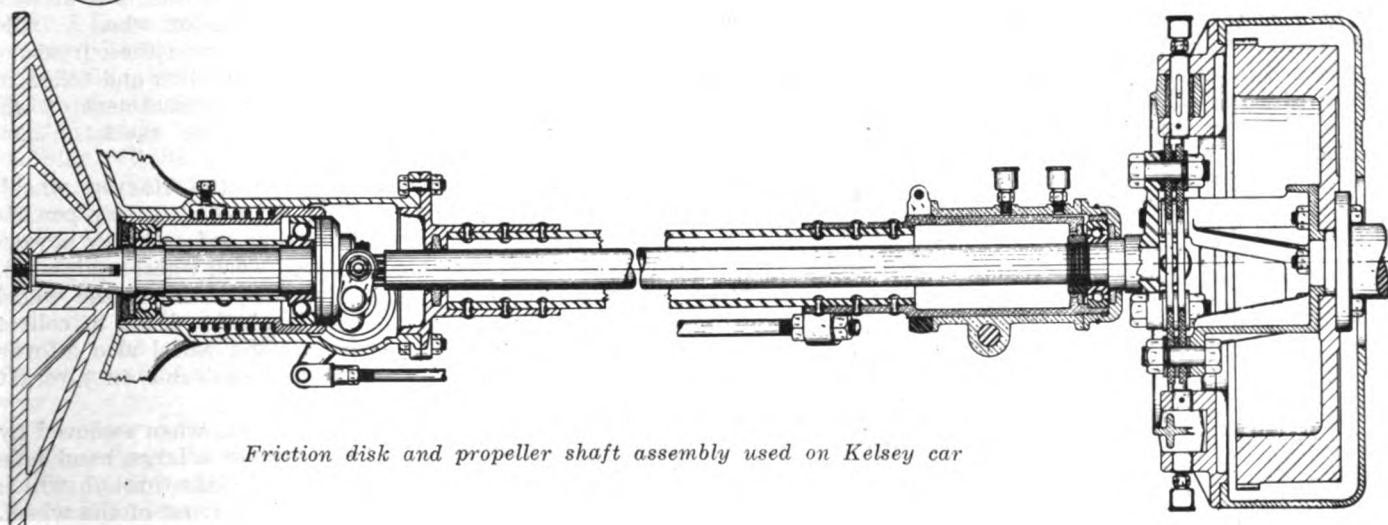
The friction drive takes the place of the regular gear transmission or gearset, and also of the clutch on the conventional car. To this end the propeller shaft and the short shaft of the friction disk are coupled together by means of a splined sliding coupling. To engage the friction members, the left pedal is pressed down, a ratchet holding it in whatever position it is set. By rocking the pedal the ratchet is released, and the pedal



Chassis of Kelsey car, showing friction drive



Vertical section of Kelsey rear axle, showing friction wheel on jackshaft and internal gear final drive



Friction disk and propeller shaft assembly used on Kelsey car

then returns to its normal position. The pedal controlling the friction disk is interconnected with the brake pedal, so that in an emergency if the foot brake is applied the friction drive is automatically disengaged. It is possible, however, for the driver to apply the foot brake and still keep the friction drive in engagement, by keeping his left foot on the clutch pedal.

The friction drive proper consists of a metal disk, thoroughly ribbed for stiffness, and mounted on a taper section of the shaft, to which it is held by a nut; and of a spoked metal wheel with a renewable fiber or mill board rim. Both disk and wheel are a little over 17 in. in diameter. The friction wheel is splined to the jackshaft, on which it slides back and forth, its position on the driving disk, and consequently the speed of the rear wheels, being controlled through linkage from the shaft lever. There is a differential gear in the jackshaft, which is located within the rear axle housing, and a brake drum is formed integral with the frame of the differential.

To each end of the divided differential shaft is secured a helical pinion, which engages with an internal helical gear bolted to the hub of the rear wheel. This pair of gears gives a reduction ratio of $4\frac{1}{2}$ to 1.

As may be seen from the sectional view of the rear axle herewith, the internal gears on the rear axle are completely enclosed and run in a bath of oil. No packing is used on the gear housing, but oil rings and return passages are provided to prevent leakage, all of the oil which is raised and thrown off by the revolving gears returning to the bottom of the housing. The supply of oil in the reservoir may be replenished by unscrewing a filler plug.

The rear axle housing, the friction disk and wheel of the Kelsey car are made of Amalite, a new alloy which is almost as light as aluminum and possesses considerably greater tensile strength than the usual aluminum alloys. Although the central housing of the rear axle is rather bulky, the axle is said to be lighter than a standard gear axle of the same capacity owing to the use of this light alloy. As the central housing is not concentric with the wheels, but concentric with the jackshaft, which is located above the wheel axis, the ground clearance is 10 in.

The engine used in the Kelsey is a six-cylinder Falls valve-in-head type, with $3\frac{1}{8}$ x $4\frac{1}{4}$ in. cylinders. Ignition is by the Atwater-Kent battery-coil system, and starting and lighting are by the Bijur 6-volt, two-unit system. The battery is a 6-volt, 94-ampere hour Willard.

The carburetor is a Tillotson and gasoline is supplied

by the Stewart vacuum system from a 14-gal. tank at the rear of the frame. Lubrication of the engine is by splash, with pump circulation. Grease cups are provided on the springs and at other chassis bearing points.

The wheelbase is 116 in. and the road clearance 10 in., which is greater than usual on cars of this size. The frame is of 7-inch pressed steel channel section, 5/32 in. stock being used. The springs are semi-elliptic all around, the front springs being 36 x 1 3/4 in. and the rear 53 x 2 1/4 in. The front axle is drop forged, its section measuring 2 1/8 x 1 1/4 in. The rear axle is a built up construction, the wheels being mounted on stub axles fitted

into the cast axle housing, as shown in accompanying cut.

The service brakes operate externally on 12-in. drums secured to the hubs of the rear wheels, the emergency brake being applied on the jackshaft by the customary hand lever. Steering is by irreversible worm and wheel with a 17 in. hand wheel, carrying the horn button at the top of the column. Artillery wheels are used, each wheel being mounted on two Timken roller bearings. Rims are of the split type, Stanweld, and tires are 32 x 4 in., with non-skid in the rear.

Body styles include a touring car selling at \$1,800, a runabout listed at \$1,750 and a sedan for \$2,700.

The Harvey Steel Disk Wheel

THE Harvey wheel is a built up steel disk wheel in the design of which an attempt has been made to reduce or eliminate the rigidity characteristic of metal wheels in general. Referring to the cuts, it will be noted that the front and center disks, with the hub as their base, form a curve arch which has its apex at the front side of the felloe, while the center and back disks, with the felloe as their base, form an inverted curve arch with its apex at the hub.

The disks forming the sides of these arches carry the load imposed upon the wheel in suspension, and when a sudden load is applied or a larger load than that which the wheel was designed to carry without deflection, the curves of the disks on the tension side increase in radii or "straighten out" slightly, while the portion of the disks

on the compression side contracts in radii or increases in curvature, thus allowing a slight displacement of the hub. As soon as the increasing tension in the deflecting disks equals the imposed load further displacement ceases.

The strength of the wheel in a vertical plane (or in the line of all bumps encountered while driving straight ahead) is said to be many times that required, because the wheel has been primarily designed to give great lateral strength. The bracing of the disks, one against the other into arches, will be seen to bring all disks into tension when a "side swipe" occurs (see Fig. 2) and here again the curvature of the disks allow a displacement of the hub and felloe to take place, this time laterally. This displacement of the felloe under lateral strains reduces the shock on the mechanism of the car.

According to the manufacturers, the Harvey wheel, though of increased strength, weighs only a few pounds more than a wood wheel on light cars and on heavy powerful cars generally weighs less than wood wheel equipment. The assembly of the disks completely encloses the wheel back and front, leaving no shelf at the felloe to collect dirt. This complete enclosing of the wheel also affords streamlining similar to that found desirable on aircraft wheels.

A cover over a hole in the front disk, when removed by one-half turn of a screw driver, leaves a large hand hole opening through the front and center disks through which the air valve may be reached from the front of the wheel. There is sufficient clearance to allow the use of the air line end and of the ordinary pressure gage.

The Harvey rim was patented some five years ago, but has been commercially available for only a year. The rim is made up of three pieces, each one-third the circumference of the bead of the tire in length, and these three sections interlock in a simple way, making a rim which is easily put on or taken off a tire.

There are two ribs rolled into the rim section, each extending completely around its inner circumference. The felloe and locking ring, each being complete circles, clamp onto these ribs completely around the rim. The felloe and rim are so constructed as to form a V groove into which the locking ring fits. The rim is thus held securely to the wheel and is not forced out of round by tightening individual wedges spaced at intervals between felloe and rim.

IT is remarked in the Air Service Information Circular that if it is desirable to adopt the principle of the auxiliary spark gap, this can be done with little alteration of existing equipment. Many types of magnetos, including the latest Dixies and Simms, incorporate the subsidiary gap in the distributor. This could also be done easily with the Liberty engine by substituting a distributor finger with a fixed gap brush.

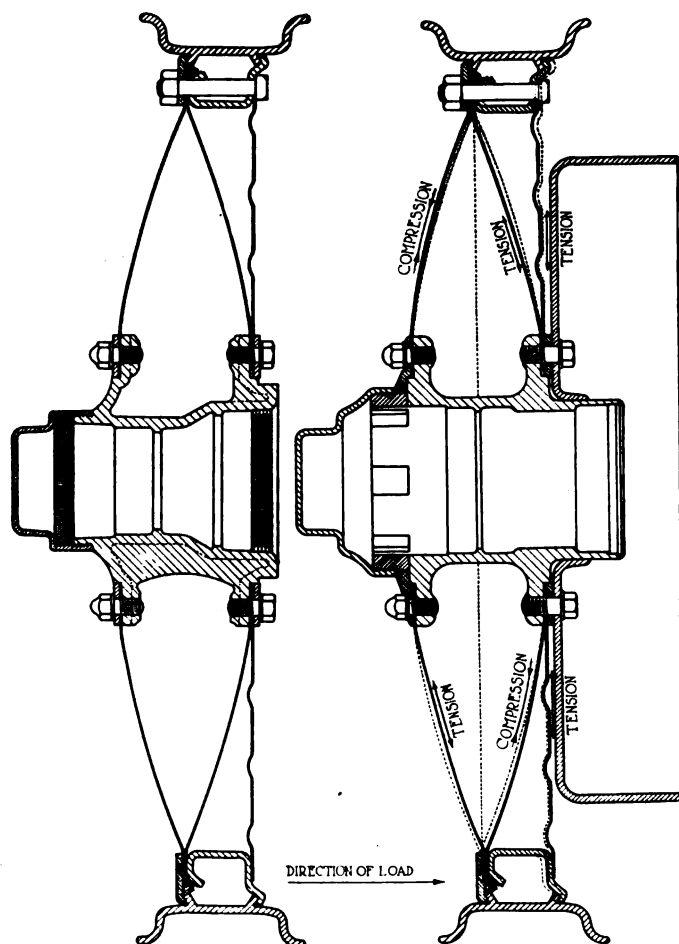


Fig. 1

Fig. 2

Harvey steel disk wheel

Engineering Features of New British Trucks at Olympia

Careful attention to details heretofore neglected and many refinements in design feature new models. Bristol 3 to 4-ton has electric lights, new transmission and 16 in. single-plate clutch. Halley uses 6-cylinder engine, shaft brake at rear of worm and novel steering connections. Austin has only unit powerplant. Single plate clutch, propeller shaft brakes, overhead worms, plain bearing rear axles and steel wheels, generally used.

By M. W. Bourdon

THE 3-4 ton chassis, made by Bristol Tramway Co., a firm with 14 years' experience as users of truck and omnibus chassis of other makes, has a pressed steel frame, with the side members 8 in. deep by $2\frac{1}{2}$ in. wide. There are five cross members, one a banjo type in pressed steel in front of the rear axle, through the central hole of which the propeller shaft passes. The latter is tubular, 60 in. in length and $3\frac{1}{2}$ in. in diameter, with spiders at each end, brazed and riveted on, and arranged to carry fabric disk universal joints. The latter are partly enclosed within short cylindrical casings to prevent the shaft ends falling in the event of the disks giving way.

The four pair-cast cylinders of the engine have a bore and stroke of $4\frac{1}{2} \times 5\frac{3}{4}$ in. Trough lubrication and a three bearing crankshaft are used. The big ends have four bolts each, and the distribution gear is by means of silent chain. The piston pin is secured in the connecting rod small end, which is not split but has a bolt passing through it below the pin, locating the latter by means of a shallow notch. The pin floats in the bosses of the cast iron piston without bushes. Thermo-syphon water circulation is relied upon, and a Claudel carbureter provides the mixture. A second (butterfly) throttle is controlled by a centrifugal governor of the floating steel ball type. The governor linkage is entirely enclosed in the crankcase, and is nowhere exposed, so that it cannot be tampered with by the driver.

The engine is suspended in the main frame at three points. The crankcase is suspended at the center above the distribution casing from a stamped steel bridge. A similar bridge at the back has the rear end of the crank-

case depending from it at two points. Dynamo lighting is standard in the equipment, the generator being arranged with its armature vertical and with a right angled shaft drive from the distribution case. A single plate clutch is used, the plate being 16 in. in diameter.

The light flywheel is 20 in. in diameter and but $2\frac{1}{2}$ in. wide. The normal speed of the engine is 1400 r.p.m., which is higher by 300 to 400 than the normal in British truck engines.

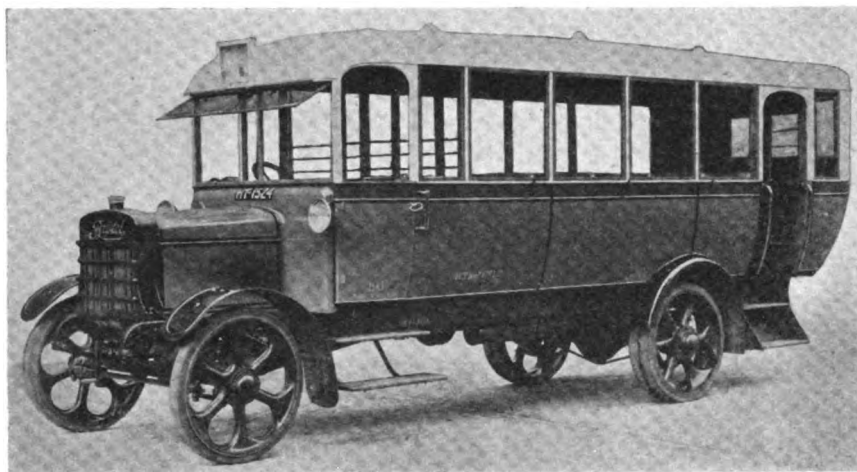
A coupling shaft 27 in. long with steel disk joints at each end connects the clutch to the four-speed gearset, which has a central lever. The movement of this lever occurs across a gate projecting up through the footboard and rocks a single shaft leading back into the gearset. At the rear end this shaft has a fork at right angles which, according to its position, as determined by the extent of oscillation, engages with an up-standing lug on one of the three selector rods. An outer sleeve incloses the end of the oscillating shaft and is slotted circumferentially and axially, the axial slot allowing only one selector rod lug to move to and fro, the circumferential slot locking the others. The designer claims low cost of production for this method as compared with other gearset controls where the lever is not actually mounted on the box; but another advantage claimed is that the low weight of the connections and the small lever-

age prevents "clashing" and damage to the gears, any endeavor on the part of the driver to ram the gears into mesh reacting so forcibly on his arm as to make him adopt less forceful methods in future.

The gear-casing is suspended at four points from brackets extending from the main frame. A transmis-



Controls of Bristol chassis. Cables of electric lighting system are throughout enclosed in metal conduits. Side and tail lamps, switch casings, footboards, footboard frame and dashboard brackets are all in cast aluminum. Steering wheel is coated with corrugated xylonite



Bristol double entrance bus seating 28

sion brake is fitted behind the gearset; this has deeply ribbed shoes lined with fabric and operated by the rotation of a cam plate, on which projecting "tongues" engage ball-ended studs attached to each shoe end. This brake drum is 14 in. in diameter by 4 in. wide. The hand brake lever operates internal shoes in open side rear wheel drums 4 in. wide of 18 in. diameter.

The final drive is by overhead worm mounted with the worm wheel as a unit and attached to the top cover of the cast steel axle. The latter has flanged and bolted-on extensions for the spring tables and wheels, which run on ball bearings. The method of locating the springs on the axles is unusual; two stirrup bolts clamp a bridge piece onto the top of the spring, the bridge having sides 3 in. wide which extend downward into milled cross slots in the spring table, and these form "keys" between spring and axle, relieving the center bolt and stirrups of longitudinal stresses.

The wheels are of the cast-steel hollow-spoked variety, with six spokes back and front. Worm and sector steering is used, with the sector shaft mounted on eccentric bushes at each side. These bushes are capable of being either rotated or moved axially after slackening pinch bolts passing through their housings in the extensions of the casing; thus both tooth slackness and sideplay can be taken up. The steering levers have ball ends with half-sockets formed in the triangular flanged ends of steel stampings attached to the rods, three bolts and nuts being used to secure each cap on which is the other half-socket. The chassis has a wheelbase of 170 in., a track of 70 in.; the final drive ratio is 7 to 1. Fuel feed is by gravity. The price of the chassis with solid tires is \$6,250.

2. The Straker-Squire 3-5-Tonner

This is a new model which, although announced nearly 12 months ago, has only just gone into production. It has a pressed steel frame, with the open side of the channels outward, the side members being 8 in. deep by 2½ in. wide at the center. The cross members consist of steel forgings at the front, and between engine and gearset a tubular member approximately midway in the chassis length and a forging at the rear. The latter also forms a bridge support for the rear ends of the back springs, and which has leading from it two diagonally arranged stiffening plates extending forward to a point inside the main frame where the brackets occur on the front end of the rear springs.

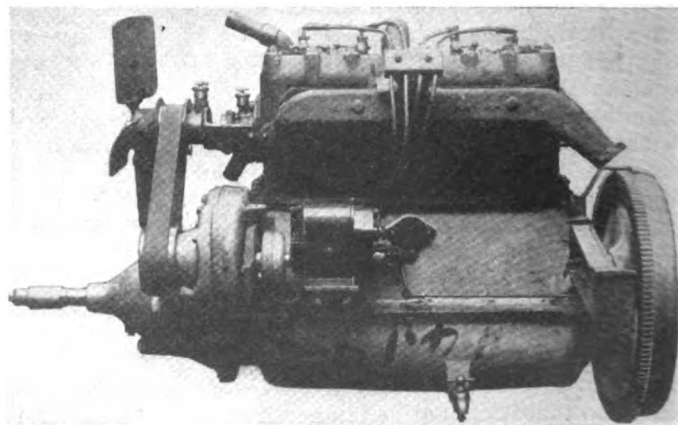
The spring mountings back and front are a special feature. The back ends of the front springs and the front ends of the rear ones have a ball-ended stud pass-

ing through the two top plates and projecting upward into a spherical socket formed in the spring bracket; the ball is drilled transversely for a lateral retaining pin. The other ends of the springs slide under blocks which have a spherical abutment in box brackets. A set screw passes up from the bottom of the bracket to prevent hammering arising from the liability of spring surface and slide block to separate on rough roads. Both front and rear axles have coil buffer springs, those at the back being stiff and long enough to take a considerable proportion of the weight when the vehicle is fully loaded.

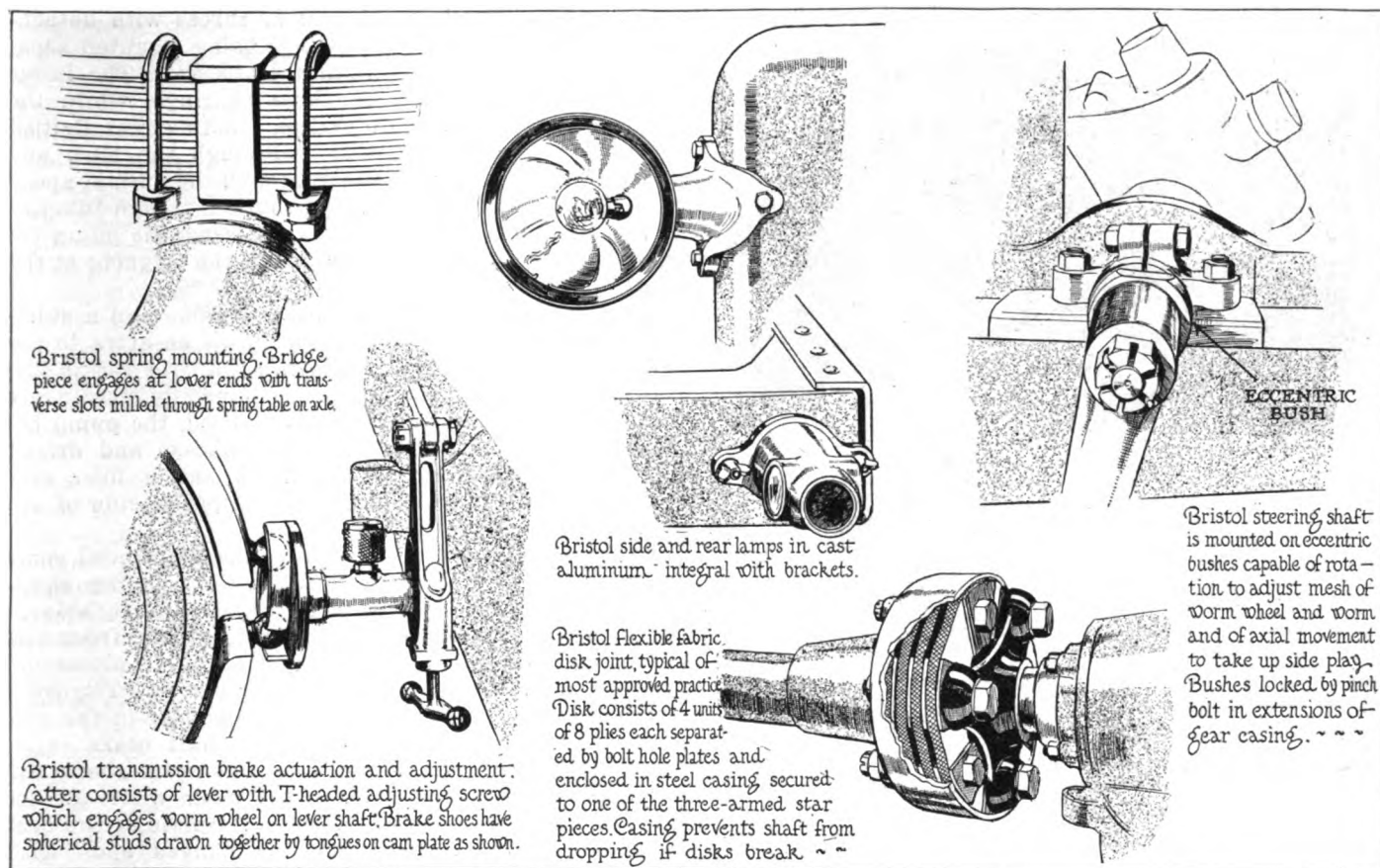
A feature of the general arrangement of the chassis, and one which provides an increased length of loading platform without extending the wheelbase, is the moving of the driver's seat rather more forward than usual, so that half the length of the engine projects through the dashboard. The driver's position is also higher than usual and the steering column projects forward to the front end of the right-hand side member. While this arrangement has the advantage mentioned, it does not increase accessibility of certain engine details, but rather the reverse.

The peculiar mounting of the overhead rockers of the 4½ x 6½-in. engine has already been referred to and illustrated in AUTOMOTIVE INDUSTRIES. It may be recalled that instead of pivot pins the rockers are supported on upstanding spring steel plates which flex when the push-rod takes effect upon the outer end of the rocker and cause the inner end to have the usual effect upon the valve stem.

The cylinders and the upper half of the crankcase are cast as a unit with a detachable head, but engine and gearset are separately mounted on a sub-frame of angle plate. The engine lubrication system differs from the usual, a plunger pump delivering oil to the camshaft bearings, through two ports through which the oil issues in a stream in the path of scoops on the crank webs, whence the lubricant is led through the hollow shaft to the big-ends. The journal bearings are of the roller type—three in number. Crank pins and journals are both 3 in. in diameter by 2 in. long; hollow wrist pins, 1¼ in. in diameter, are fixed in the rod end, with phosphor bronze bushes in the piston. Water circulation is by a pump at front end of cylinder block, the impeller being mounted on extension of the belt-driven fan shaft.



One of the few block cast cylinder and detachable head engines among British trucks—the 20-hp. Albion for 2800 lb. loads. Bridge forgings support crankcase at front and rear in main frame



Some details of British trucks exhibited at Olympia

The four-speed gearset has its shafts arranged side by side on ball bearings. The casing is a one-piece casting with four arms projecting to the subframe, the lay shaft having an extension provided for supplementary drives, such as tipping gear, etc. The open propeller shaft is approximately 110 in. long, of $3\frac{3}{4}$ in. diameter tube, with an unenclosed star type joint at each end. The pins of these joints have blind phosphor bronze bushes, stuffing boxes to prevent the escape of lubricant at their inner ends and central lubrication. Overhead worm gear forms the final drive, the worm and worm wheel being mounted as a unit with the cover plate of the cast steel one-piece axle casing. The wheel bearings consist of floating bushes on the axle ends, while the springs are under-slung from the axle by stirrup bolts 1 in. in diameter.

Both brakes take effect on 22 in. x 7 in. drums bolted to the seven hollow spokes of the cast steel wheels. The brake anchorage brackets, bolted to the axle casing, have circular gutters with drain pipes to carry off any oil that may leak from wheels or axle ends. The chassis price with solid tires is \$6,500.

3. The 2-Ton Commer

Several features hitherto associated with Commer trucks have been discarded in this new model. For example, chain drive, constant mesh wheels and dog clutches in the gearset, and rolled steel frame sides. This new type has a pressed frame with a cast front cross member and four pressed cross members. The 4 x $4\frac{3}{4}$ -in. four-cylinder engine has pair cast L head cylinders and three-point suspension by means of a trunnion bearing at the center in front and a bridge at the back bolted to the end face of the one-piece aluminum crank-chamber. The crankshaft is carried on three ball-bearings. A trough system of lubrication is used, the oil

pump delivering the whole of its supply through a direct lead to a sight feed indicator on the dashboard, the lubricant flowing thence by gravity through a $\frac{7}{8}$ -in. pipe to distributing passages in the crankcase.

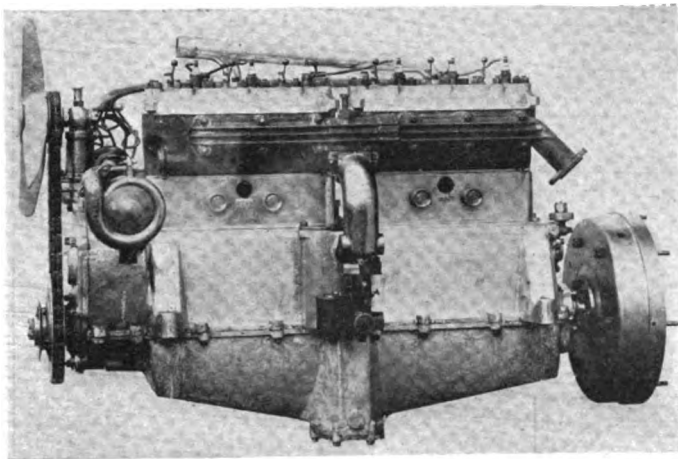
Water circulation is by thermo-syphon through a vertical tube radiator with cast aluminum tanks and side plates, the latter having lugs mounted in fiber-lined trunnion bearings supported by the front cross member. No governor is fitted, nor are the valves inclosed. A small diameter cone clutch with high spring pressure conveys the drive to the three-speed gearset, which is slung from two cross members, the coupling shaft having a single flexible steel disk joint. Behind the gearset is a transmission brake with cam-operated shoes and metal liners acting upon a drum of small diameter (8 x 4 in.).

The propeller shaft is semi-inclosed, an open coupling shaft occurring between the gearset and the front universal joint, which is located within the spherical end of the torque tube, the latter being supported by a deep-pressed steel cross member.

An overhead worm gear forms a final drive with a unit mounting which forms the cover plate of the cast steel back axle; the latter has bolted-on flanged extensions for the rear wheels, the latter running on floating bushes. Open-sided drums are used for the expanding rear wheel brakes. The cast steel hollow spoked wheels have twin solid tires at the back and seven spokes. The front wheels have six spokes. With solid tires the chassis is sold at \$1,125.

4. 30-Cwt. Albion

This, a new model made by one of the oldest firms of truck manufacturers in Great Britain, has several radical departures from the makers' practice current hitherto. The pressed steel frame, 6 in. deep and $2\frac{1}{4}$ in. wide,



Six-cylinder engine of Halley 3-3½ tonner has cylinders in threes with detachable heads. Expansion joint occurs in length of ribbed exhaust manifold

has displaced the rolled channel section of the older types. Three tubular and two pressed steel cross members are used. This is one of the few British truck chassis having an engine with block cast cylinders ($3\frac{1}{2} \times 5$ in.) and a detachable L head. The two-unit aluminum crankcase has a four-point suspension system from bridge forgings back and front, the bridges being secured directly to the side frame members. The system of forced lubrication is distinctive, there being five small pumps delivering lubricant to each main bearing of the hollow crankshaft and to camshaft and other subsidiary bearings.

An inclosed throttle governor is standard, the water circulation being by a pump driven by the $2\frac{1}{2}$ -in. wide flat fan belt; the pump casing is secured to the front of the cylinder jacket with an accessible gland adjustment for its shaft.

A single plate clutch is used with a solid coupling shaft to the three-speed gearset, which is hung from two longitudinal milled steel bars, which in turn are suspended from two pressed steel cross members. The selector gear is exposed, the hinged hand lever engaging directly with either of two forked levers as it passes across the gate, the forked levers being mounted on concentric shafts, which at their inner ends have "fingers" to engage with forks on the selector rods.

Within the gear casing the shafts lie side by side, the main shaft ends having felt packing glands adjustable from outside; a contracting type shoe brake is arranged at the front of the open propeller shaft, which has two metallic joints, one star type and one sliding block. Overhead worm gearing is the final drive, mounted as a unit above the ring or banjo type forging forming the axle casing center. The ring center is horizontal, and has a cast steel oil pan and stiffening plate below it. The wheels run on plain stationary bushes on the axle ends; torque is taken by the springs, and inclosed expanding rear brakes are attached to the web cast steel wheels. Chassis price is \$4,000.

5. 3-3½-Ton Halley

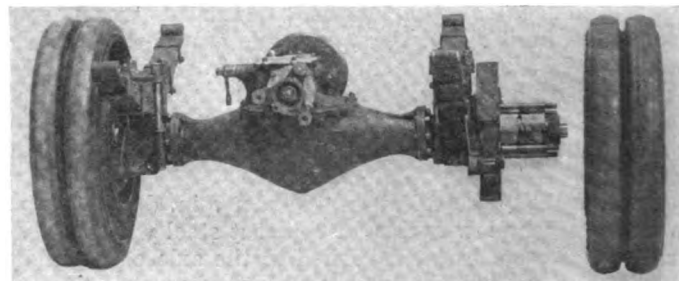
This is the only six-cylinder British truck, and although it is a new type, it has a rolled steel frame with the open sides outward. Two cast steel cross members carry a subframe for the engine only the gearset being suspended from two tubular cross members at three points. Behind this there are two pressed steel cross members, the rearmost having diagonal struts to the main frame.

The engine cylinders are cast in threes with detachable L heads, the cylinder castings being mounted separately on the aluminum two-unit crankcase. The latter supports the crankshaft in three bearings, while the connecting rod big-ends, departing from current British practice, have only two bolts, although the bore and stroke of the engine are $3\frac{1}{2} \times 6$ in. and the normal speed is 1200 r.p.m. Silent chain distribution, trough lubrication and pump water circulation are used, the pump being driven by a transverse shaft with the magneto at the other end.

Provision is made for a lighting dynamo and a starting motor, and these can be supplied as an extra to the normal chassis, which is sold with solid tires for \$6,600. Provision is also made for a mechanically driven air pump. When giant pneumatics are fitted, the pump being located on the right of the crankcase and driven through skew gearing, a dog clutch and a fiber disk coupling from the camshaft on the opposite side of the engine.

A single plate clutch connects to the four-speed gearset by means of two disk joints in the coupling shaft. The gear shafts are splined and arranged side by side on ball-bearings. A mileage recorder is driven from one of the lay-shaft pinions and supported by an aluminum bracket below the right side frame member. The solid open propeller shaft has splined ends sliding in the star pieces of two fabric disk joints. A shaft brake is located at the rear end of the overhead worm shaft, the bearings of which and those of the worm wheel are located in housings attached to the cover-plate of the cast steel axle casing. The latter has flanged ends with bolted-on extensions for the spring mountings, brake anchorage and ball bearings of the wheels. The transmission brake on the worm shaft and the wheel brakes are all of the internal variety, the rear wheel drums having open sides.

A feature of the steering is the mounting of the lever so that it extends above the worm shaft. This arrangement puts the drag link in a higher position and enables the front wheels to have a wider lock. The drag link is coupled at its front end to a steering lever secured by three bolts to the top of the jaw end of the swivel



Halley back axle with worm drive and brake at rear end of worm shaft. Rear wheels run on ball bearings

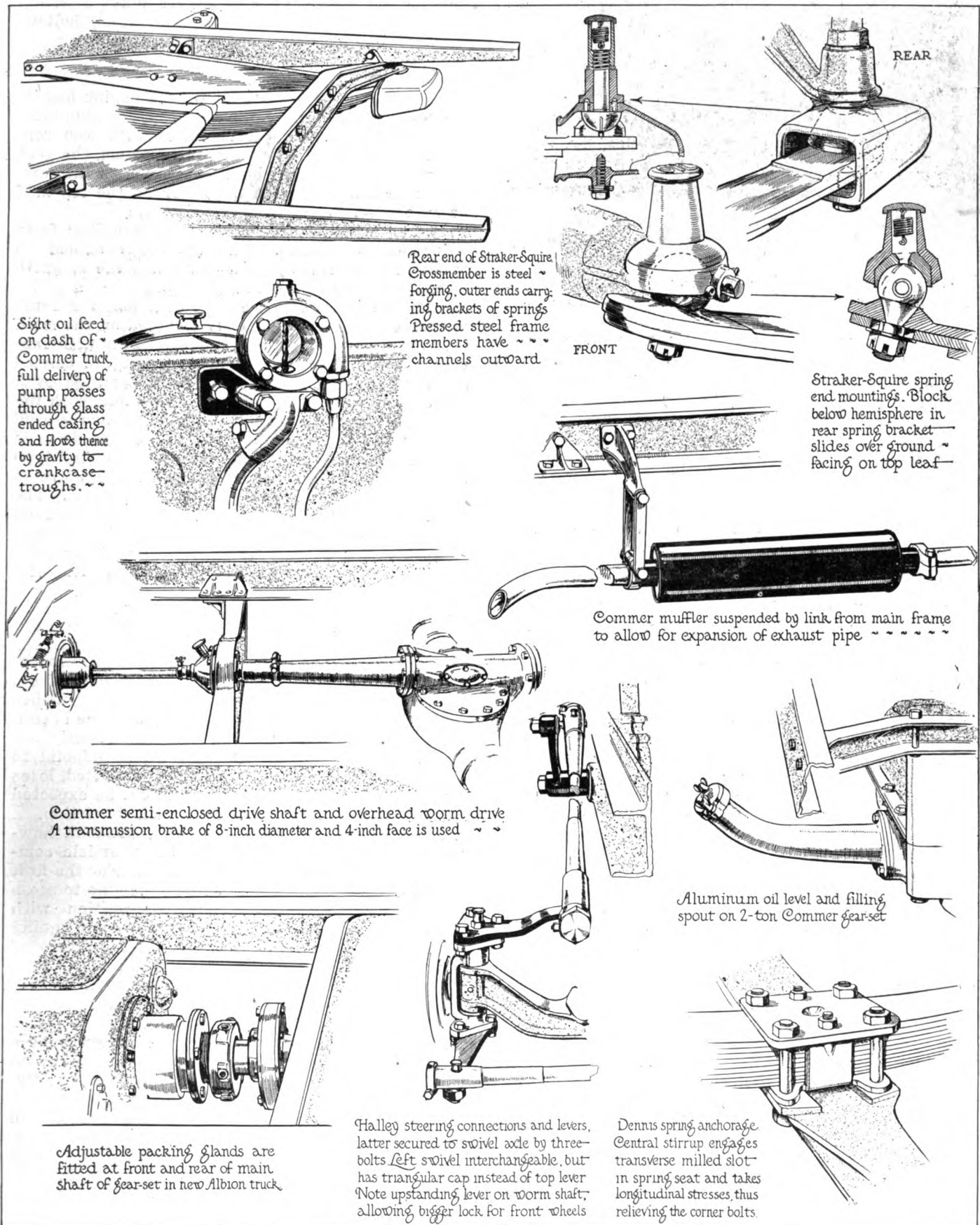
axle. A similar lever is used below the swivel and on that at the opposite side for the coupling rod. This construction enables the swivel axles for right and left sides to be made identical in form and interchangeable.

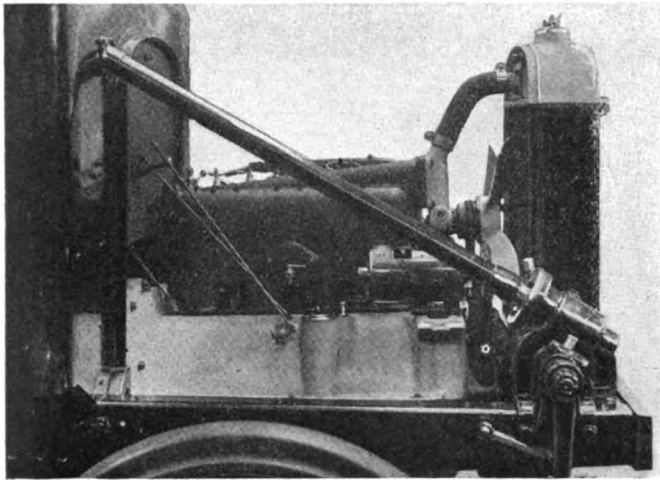
The radiator is mounted on trunnion bearings, has vertical gilled tubes and cast aluminum tanks. Cast steel hollow spoked wheels are used, the wheelbase being 160 in. and the track 62 in.

6. 30-Cwt. Austin

This is the only British truck chassis with unit construction of ($3\frac{3}{4} \times 5$ in.) engine and gearset, this unit

Some Novel Constructional Features of British Trucks





Austin block cast, 3 3/4 x 5 in., engine. Steering column extended outside hood to front end of frame

being practically identical with that of the Austin touring car. The block cast cylinders have a detachable I. head and are mounted on the aluminum crankcase, the lower half of which embodies the housings for the crankshaft bearings. The power unit is supported at three points the gearset providing four speeds with a central lever which slides across the gate cast in one piece with the lid of the box. An extension of the gear lever gate supports a transverse shaft, which has right and left-hand square threads at each end, and serves to contract the shoes of the transmission brake when partially rotated by pedal actuation.

The propeller shaft is tubular, 90 in. long and 3 in. in diameter, with a star joint at the front and a sliding block joint at the rear. The overhead worm is carried in the center piece of the three-part axle, which is divided vertically at each side of the worm casing. The extensions are tapered and of cast steel and carry the wheels on their outer ends. The exposed expanding rear wheel brakes are cable operated and are actuated by a hand lever bolted to the right-hand frame member.

The pressed steel frame, 7 in. deep by 2 1/2 in. wide, has five cross members of pressed steel. One is of banjo pattern and is placed in front of the rear axle, with the propeller shaft passing through its center. This chassis is sold at \$3,625. Novel features are the use of wood wheels and the prolongation of the steering column, so that the box is carried at the front right-hand corner of the frame, the column passing outside the hood.

7. 2 1/2-Ton Dennis

The pressed steel frame of the Dennis chassis is exceptionally stiff for a truck of this load capacity, being 7 in. deep x 2 1/2 in. wide and 5/16 in. thick. Pair cast cylinders with T heads and inclosed valves are used for the 4 1/8 x 6-in. engine, which has trough lubrication, pump water circulation and a fan driven by a 1 3/4-in. flat belt behind the vertical type gilled tube radiator. A single plate clutch is used, the coupling shaft to the four-speed gearset having flexible joints formed at each end, the latter being spherical with a series of half sunk steel balls engaging with grooves in the driving and driven casings attached to clutch shaft and gear shaft respectively. A central sliding gate change is arranged in front of the gearset. The latter is supported by two pressed steel cross members and has its main shaft over its lay shaft. A contracting type brake is attached to the rear of the transmission.

Ball-bearing star-type universal joints are used at each

end of the open propeller shaft, which is coupled to an overhead worm assembled as a unit with the worm wheel on the top plate of the cast axle center. The axle casing has bolted-on extensions carrying the wheels on floating bushes, while the rear brakes operate within open-sided drums attached to the cast steel, hollow-spoked wheels. Chassis price is \$4,800.

8. 30-Cwt. Vulcan

The four-cylinder 3 1/2 x 5 1/8-in. L head engine has its cylinders cast as a block and mounted on the aluminum crankcase, which has supporting arms with web connections. Lubrication is by the trough system, the gear type pump being driven by bevel gearing from the camshaft, and located alongside the latter on the top half of the crankcase.

The water pump is driven by a dog coupling from the distribution gearing. Its shaft is extended to carry the flexible joint by means of which the magneto is driven.

Between the fabric-faced cone clutch and the four-speed gearset, which is separately mounted on the main frame, is a universally jointed coupling shaft with fabric disk joints. The shafts in the gearcase are carried on ball-bearings, the gear sleeves being operated by a central sliding lever in a gate formed as a unit with the top half of the casing. A contracting type brake is used at the rear end of the main shaft, whence the drive is taken through an open propeller shaft with star type universal joints having plain bushes. Final drive is by worm gearing within the full floating back axle. The rear wheels are carried by floating bushes. Inclosed expanding type brakes are attached to the web-cast steel wheels, which are fitted as standard with either solid or pneumatic tires. The price of this chassis with solid tires is \$3,360.

A Tribute to American Motorcycles

THE statement was made by C. H. Lang, a Harley-Davidson dealer who has returned recently from England, that after thoroughly investigating a number of foreign motorcycling manufacturing plants, he is convinced that the American motorcycle is distinctly superior from an engineering and technical standpoint to any foreign machine. Such praise, though merited, loses some force as coming from one who might be expected to be in a frame of mind favorable to such conviction.

An interesting corroboration of this statement, however, appears in the London Times in an article commenting on the English motorcycle show. "For the first time," the London Times says, "will one be able to see a deliberate intention to enter into competition with America in producing a motorcycle capable of going anywhere and giving good service under conditions of ill-usage, overloading and neglect."

This shows a very high regard for the workmanship of the American motorcycle. It attributes to the American product, in fact, desirable attributes which even American manufacturers might hesitate to claim. When a motorcycle is produced which will continue to give good service "under conditions of ill-usage, overloading and neglect" we may reasonably expect to see one which will operate without fuel. Nevertheless, the compliment to the American machine is worthy of note.

THE Federal Department of Labor has undertaken a survey of sixty-five industrial cities of this country to determine the present unemployment. The classifications used in the census reports will be used for this work and the results should be announced Jan. 15.

An Internally Trussed Commercial Plane of American Design

The bat-wing plane developed during the war is adapted to commercial use in the Stout three-passenger aerial sedan. Ingenious plywood construction eliminates all wires and gives low wing loadings with high factor of safety. Wood wing covering, floor boards and seats utilized as structural parts. Complete enclosure, clear vision and other provisions for comfort and safety of pilot and passengers. Landing speed 40 miles an hour and maximum speed of 120 miles. Low maintenance and operating costs are claimed with 14 miles per gallon of fuel consumed.

FLYING tests have just been completed by the Stout Engineering Laboratories on their new commercial type monoplane, an enclosed aerial sedan, which is a further development of the so-called bat-wing machine built by Mr. Stout for the government during the war.

This machine is a three-passenger, completely enclosed, internally trussed monoplane, having the wing mounted on either side and above the fuselage. It differs from previous airplanes in that the wings extend almost to full length of the fuselage at the center, though they taper to a very small chord at the tips.

The machine is built entirely of wood, even the wings being covered with very thin three-ply wood, glued on in panels. The wings are trussed inside with six lattice girders, also of wood and veneer construction, with the wing surfacing and batten ribs connecting the spars forming a unit monocoque wing said to be of unusual strength in proportion to its weight. While the weight is the same as that of most biplanes, the factor of safety is claimed to be more than doubled.

According to the designer, "the completed ship, while having 30 sq. ft. more than the German Junker airplane, which is its nearest prototype, weighs almost 400 lb. less, while its structural strength by calculation is easily doubled. The total ship weighs 1940 lb., empty, as against 2380 lb. for the German ship. Its landing speed, how-

ever, is 10 miles less and its maximum speed greater than that of the German plane. In the flying tests the plane flew at a maximum speed close to 120 miles an hour, yet made landings at 40 miles per hour."

With the machine fully loaded, the wing loading is about 8 lb. per sq. ft., and the plane takes off the ground at about 50 miles per hour. It has a cruising radius of 5 hours. Its factor of safety is 8, and, in all fittings, 10.

The fuselage is of streamline form, built entirely of veneer. The first part of the structure is a keel, running fore and aft, to which are fitted bulkheads at specified distances in proportion to the stresses. These bulkheads are connected by battens or wooden strips, running fore and aft, and to which the outside veneer is glued. This makes the entire fuselage, when completed and glued up with water-proof glue, practically a one-piece structure. The seats, flooring, etc., serve as a part of the structure, as well as for their normal uses.

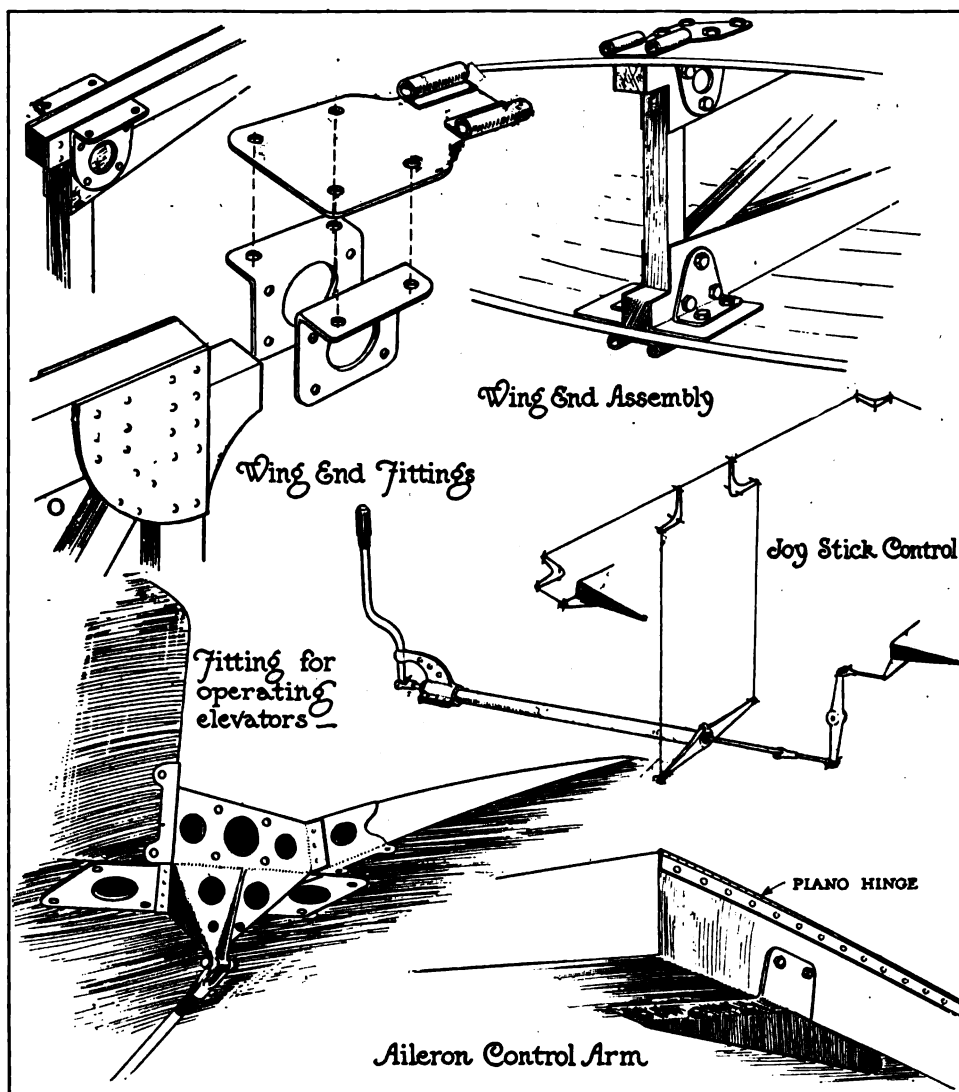
The wings are attached at the top of the fuselage. Their maximum depth is 17 in. The six spars formed of veneer sections are made up of spruce combined with plywood gussets into the form of a double Pratt truss. These spars taper with the wing from the root, or fuselage end, to the tip, so that the wing curve is kept constant throughout, and yet all spars are straight members.

The spars weigh only 10½ lb. each. The combination of the ribs and plywood in the form of the wing curve fore and aft reinforces the spar enormously, in forming the whole wing into a sort of reinforced tube which practically gives double the strength of the spars alone. Additional wing compression members are added on top at the points where the maximum stresses occur. All drift is taken by the veneer covering itself, the factor of safety in this direction running into the hundreds.

The control surfaces are built in the same manner as the wings, with tapered spars of wood and veneer glued on the outside. The stabilizer area at the rear is adjustable while in flight. The rudder is a continuation of the flat sides of the fuselage at the rear, and hence has considerable action in proportion to its surface, so that by counterbalancing it, for a comparatively small effort on the part of the pilot it has more



Spars for Stout plane weighing 10.5 lb. Each pair is tested under a load of 2500 lb., as shown by this illustration. The spars are supported only at the root, as shown at the left



than the usual effect, even on this fuselage, which is much shorter than on the usual airplane. The machine can be turned about in almost its own length while taxi-ing on the ground.

There are no wires or turnbuckles in the plane, nor need any adjustment be made after flight, except as relates to engine performance. All controls are push-and-pull tubing, with bell-cranks and ball joints where needed.

The seating arrangement is rather unusual, the pilot sitting forward, just to the rear of the engine. There is a wire-glass window just over the engine hood, as in automobile practice, through which the pilot gets his forward vision. On his right and left, opposite his eyes, are the wings, and looking down on either side he gets a clear vision of the ground for landing. For vision above, an overhead window is provided.

Back of the pilot and a step lower down, is the floor of the body proper, with a door on either side, as in motor car practice, these doors being close enough to the ground when the ship is at rest so that passengers can step directly from the ground into the body without using a ladder.

The two passengers sit side by side op-

posite the windows, just to the rear of these doors, thus making a three-window arrangement on each side of the fuselage, the central windows being in the doors. Just back of these windows is a round porthole for inspecting the controls and rudder at the rear end of the fuselage.

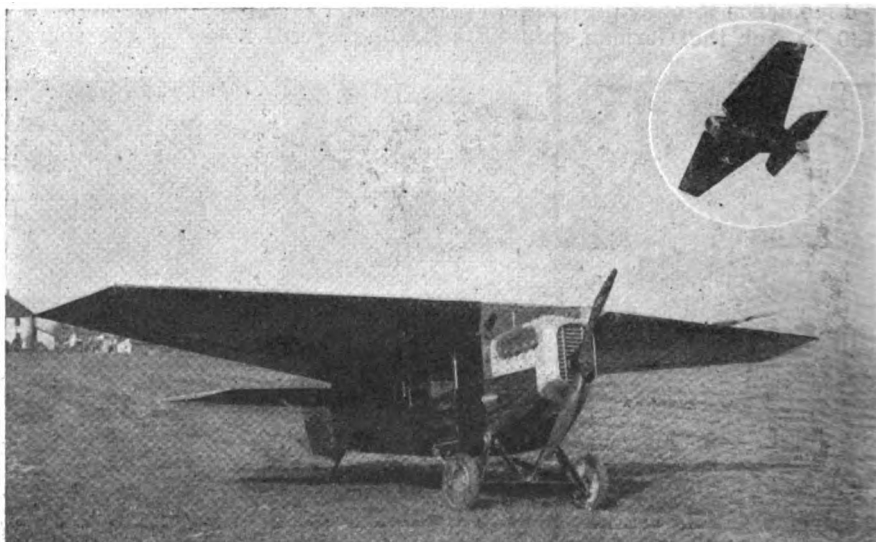
The control is by the usual joy stick; and the aileron, elevator and rudder arrangements are standard, as are also the engine controls. Added features are an electric starter button on the floor, and a primer on the dash.

The powerplant is a Packard eight-cylinder aviation engine, with many new installation features. As a fire preventive, the carburetor is located below the crankcase and the air intake into the carburetor is led completely outboard, so that any backfire from the engine will be conducted outside the fuselage.

The gasoline lines have flexible connections throughout, so that vibration will not affect them. The tanks are 12 ft. away from the engine, in the wings on each side of the pilot, and the gasoline gage is directly in his line of vision. A loop is provided in the gas line so that if there is any leakage in the tank the gas will run down the pipe and drip onto the floor beside the pilot, and the leakage be detected immediately. The feed is by gravity alone, with a head of almost 5 ft.

The landing gear is of more or less conventional type, but on account of the wing clearance from the ground, it has been possible to arrange for more length in the rubber bands than is possible in the usual biplanes, thus making for far greater landing safety in rough places.

The propeller is of birch wood and is made specially



©Underwood & Underwood.

Stout aerial sedan about to take-off on its trial trip
(Insert) Stout aerial sedan in flight

for this machine by the American Propeller and Manufacturing Co. It is 8 ft. 6 in. in diameter and gives an air speed of 120 m.p.h. at 1700 r.p.m.

All of the fittings are ingeniously designed and are made up of cold-rolled stock, a commercial material always easily obtainable, rather than of high tensile alloys of which deliveries are sometimes uncertain.

The major feature of the plane, outside of its all-wood construction, is the extreme length of its chord at the center of the machine. It has, in fact, more of a "butterfly" plan view than a "bird" outline, but by this means increased area is obtained within a small space.

William B. Stout, designer of the plane described herewith, was formerly on the editorial staff of *Motor Age*,

one of the Class Journal publications. From this work he entered the manufacturing field, acting on the engineering staff of the Scripps-Booth and Packard companies, being chief engineer of the aircraft department of the latter.

During the war Mr. Stout was technical advisor to the Aircraft Board at Washington, and since his release from these duties has been engaged on the development of his internally trussed wing plane. The plane described in this article is the third of the series developed.

The Stout plane is now ready to make further tests, as the weather permits. Work is also in progress on the all-metal airplanes of much larger size which this firm is building for the Navy.

Curtiss Eagle Commercial Plane With Liberty Engine

WE show herewith a photograph of the Eagle commercial plane of the Curtiss Aeroplane & Motor Corp., fitted with a 400-hp. Liberty engine. This plane is capable of carrying ten persons or three-quarters of a ton of freight at the rate of 105 m.p.h. for a non-stop flight of ten hours' duration.

This new type of aerial carrier flown by Bert Acosta in several test flights, carried aloft a useful load of 3533 lb. or 9 lb. per hp., which useful load-horsepower ratio is said to mark a distinct advance in airplane performance. The trials were witnessed by Brigadier-General William Mitchell of the U. S. Air Service. A fuel supply of 1500 lb. (600 gal.) was carried. This is sufficient for a flight of ten hours' duration. A speed of 105 m.p.h. was made with full load. The landing speed is approximately 50 m.p.h. with full load. This is lower than that of most two-passenger machines. The ceiling is 10,000 ft. with full load.

The Curtiss Eagle was designed to meet three specific requirements of flying. One was the need suggested by such air transport as the United States Aerial Mail Service for airplanes which could carry large quantities of mail over long distances. Another was the ever increasing demand for a large-capacity airplane for the economical commercial and military transportation of freight or passengers. The third was for ambulance service.

The Eagle has every appointment possessed by the high-class limousine. Entrance is made through a side door reached by means of removable steps. The enclosed compartment is finished in leather, with eight individual leather-upholstered seats, staggered to permit easy movability and is provided with dome lights. Curtained windows of celluloid give free vision and protection from wind and noise at the same time. There is a compartment for luggage to the rear of the passenger cabin. The entire

cabin space can be easily converted and utilized for freight carrying.

The body or fuselage is built of ply wood, in monocoque form, and combines lightness with strength and solidity. Streamlining similar to that of the Curtiss Oriole and Wasp is maintained, the fuselage holding the single motor in front, widening into the passenger cabin and narrowing toward the tail.

The landing gear is designed to take up shocks in landing. It is composed of two sets of wheels arranged in tandem. Following are the chief dimensions of the plane: Length, 36 ft. 9 in.; width, 61 ft. 4 in.; height, 12 ft. 4 in.; gross weight, 7423 lb.; useful load, 3533 lb.

Use of Tungsten in High Speed Steel

THE bulk of the world's tungsten is used for the manufacture of steel, and especially for that brand known as high speed steel. It was at the World's Fair in Paris, in 1900, that the first cutting tools made from this steel were publicly exhibited. The increasing hardness of the metals and metallic alloys used in the industries called for the creation of new tool equipment. Thanks to tungsten steel, it is now possible to easily work the hardest metals, and to multiply the production capacity of machine tools by permitting them to operate at a materially increased speed.

In 1911 an American automobile manufacturer, in the course of a conference, made the remark that the substitution of high speed steel for the old carbon steel tools had enabled him to increase his production five-fold, and reduced the cost price of his chassis by \$200. High speed steel, however, can be employed only on heavy machines designed for high speed work, and manufacturers generally hastened to modify their old tool equipment.



The Curtiss Liberty-motored Eagle

IN an address before the National Rivers and Harbors Congress, Secretary Alexander said: "The improvements of our rivers and harbors and their relation to our commerce, domestic and foreign, has been the subject of academic discussion for many decades. But as time goes by and the need for more adequate and economic means of transportation becomes more apparent and pressing, the more insistent should be our demand that the great projects already undertaken should be carried forward consistently and without interruption.

Atwater Kent Starting and Lighting on Packard Six

Die-cast aluminum used to save weight. Third brush regulation and Bendix drive employed. Parts are simple and substantial and in some cases specially made for this application. Particular attention has been paid to proper lubrication. Double wiping contact provided in cutout.

By J. Edward Schipper

THE Atwater Kent starting and lighting equipment recently adopted by the Packard Motor Car Co. as standard equipment for the new Packard single six represents some interesting points in electrical development as applied to automotive equipment. It is a two unit system, for operation on 6 volts. The generator is shunt wound and employs the third brush method of regulation. With the starting motor is used the standard Bendix drive on a 10-tooth pinion. An effort has been made to do away with all delicate adjustments and parts and to maintain light weight in both units. Consequently the use of aluminum die castings has been resorted to in a great many parts, including the brush end head on both the starting motor and the generator, and the drive end head on the generator.

The Starting Motor

The starting motor is $4\frac{1}{4}$ in. in diameter, $14\frac{1}{2}$ in. in length overall and weighs $22\frac{3}{4}$ lb. A special barrel mounting is used. The generator weighs $19\frac{3}{4}$ lb., is $4\frac{1}{2}$ in. in diameter and $9\frac{1}{2}$ in. long, excluding the drive shaft extension. It is mounted by means of a special flange. The generator size was determined by the requirements of an unusually low cut-in point, and at the same time to permit of continuous maximum output at safe temperatures.

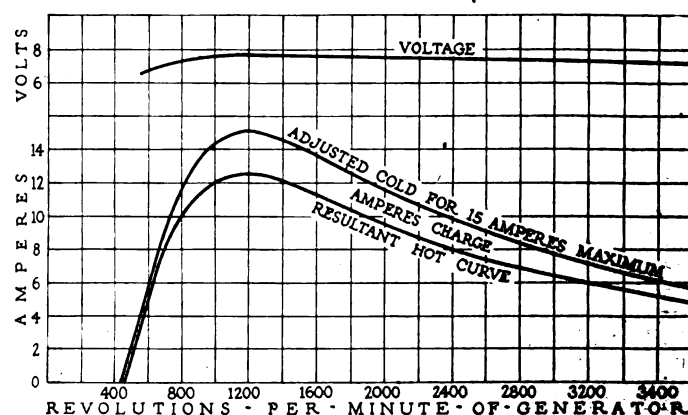
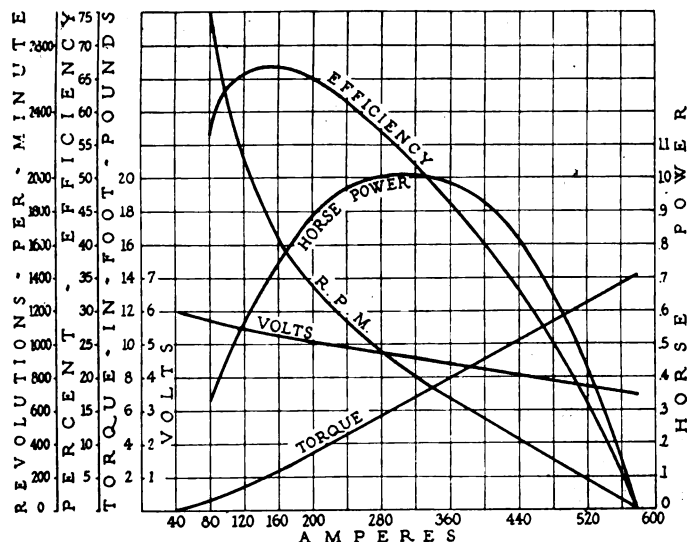
The material used in the shells is 10 per cent carbon steel tubing. The pole shoes used are made from rolled stock, with ground surfaces. The pole piece contours are held to very close limits in order to insure uniformity in elec-

trical characteristics and reduce the possibility of magnetic hum. In the armature assembly, the shafts are carefully heat treated and accurately ground. The laminations are made of sheet steel punchings individually keyed to the shaft, and forced on under pressure. The armature windings are impregnated and oil slingers and other precautions have been taken in the generator to prevent oil from working through to the commutator and brushes.

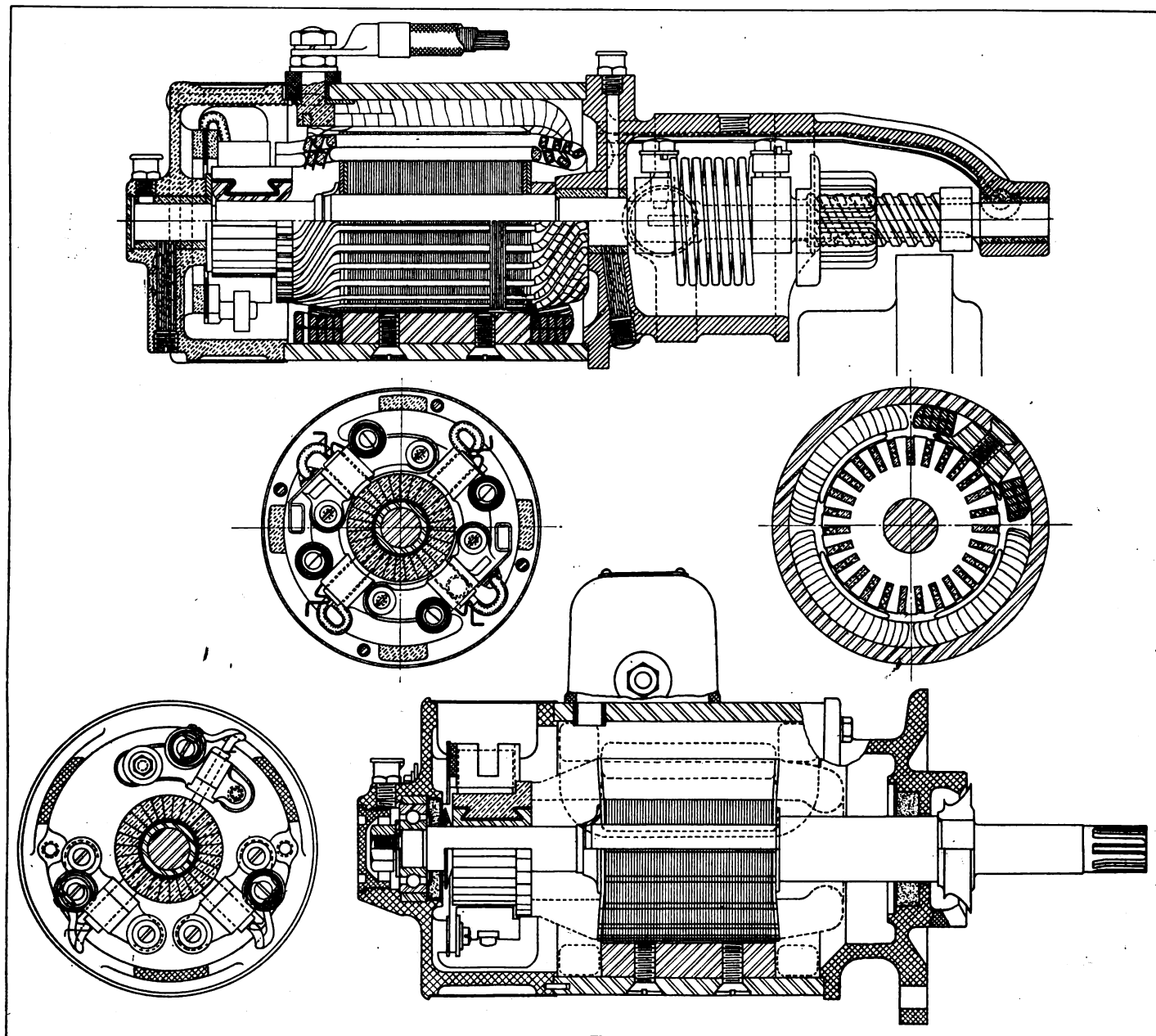
Three bronze bearings are employed in the starting motor and a ball bearing in the brush end head of the generator. There is no bearing integral with the generator at the drive end head, because of the unique method of drive employed by the Packard company. The generator head is machined to fit an auxiliary bronze bearing plate which accurately centers the generator shaft, and, in addition to furnishing a large bearing surface, carries the thrust of the generator shaft sprocket which fits over the splined portion of the shaft, as shown in the illustration. The sprocket is not a force fit, but is held in place by the pressure of the coil spring in the front of the gearcase. The complete unit is located by the single stud bolt at the bottom and is free to swing about this as an axis before clamping in place with the proper center distances.

Lubrication

A great deal of thought has been given to lubrication. The generator is equipped with an oil cup and bearing felt at the brush end head. In the starting motor, there are two oil cups, one at each main bearing. Provision for



To the left—Characteristic performance curves of starting motor. Above—Curves showing output of generator at various speeds



Sectional views of Atwater Kent starting motor and generator used on Packard chassis

oiling the outboard bearing is made by means of a tube connected with the intermediate head, and fitted in a groove on the inner surface of the outboard housing.

The brushes used in both the generator and starting motor are held in place by aluminum die-cast brush holders. Pigtailed securely fastened to the brushes are used. In the generator, the spring tension and the size and composition of the brushes is such that the wear on the brushes and commutator has been found negligible after 5000 hr. continuous running at maximum output. The third brush on the generator is easily accessible and, having both an inside and outside adjustment, a wide range of output is obtainable.

The cutout assembly, with reverse current relay, is mounted on the generator. A wiping contact is provided and the contact points are double. A phosphor bronze spring supplies the tension. Cutout cover is a die casting.

The generator characteristics are shown in the accompanying curve. Considering the size of the generator, the slight difference between hot and cold output is worthy of note. The unusually low cut-in point, and the rapid rise in output are obtained without sacrificing any desirable

characteristics. It will be seen that after reaching the maximum output at approximately 1300 r.p.m., the curve droops very slowly, furnishing a substantial charging current at fairly high speeds.

The starting motor attains its maximum efficiency at about 1700 r.p.m. and develops 1.15 hp. at 650 r.p.m. The stall torque is rated at 16 lb.-ft.

The starting switch was designed especially for the Packard car, and considerable aluminum is used in its construction. The switch housing is mounted on a sherardized steel plate which in turn is bolted to the flywheel housing of the crankcase. A third terminal is provided for the ammeter connection.

Style and finish of the Atwater Kent equipment are plain but serviceable. The aluminum heads are sand blasted and the shells are finished in smooth, hard, black enamel. After final assembly, every machine undergoes a 24 hour test run. Generators are tested for output adjustment, charging current, noise and magnetic hum, as well as temperature rise under adverse conditions. All starting motors are tested for stall torque, current consumption and efficiency before shipping.

New Continental Cars Shown at Olympia

Present marked contrast with British design, especially in use of four-wheel brakes, battery ignition, and preference for cantilever springs, detachable cylinder heads and unit powerplants. Spyker bristles with novelties. Clean design features the new Spa and the Isotta. New S.L.I.M. uses air for starting and for operating brakes. Valve-in-head gaining. Aluminum dashboard common. Several fan-clutches employed. No external brakes are used, and transmission brake is being abandoned.

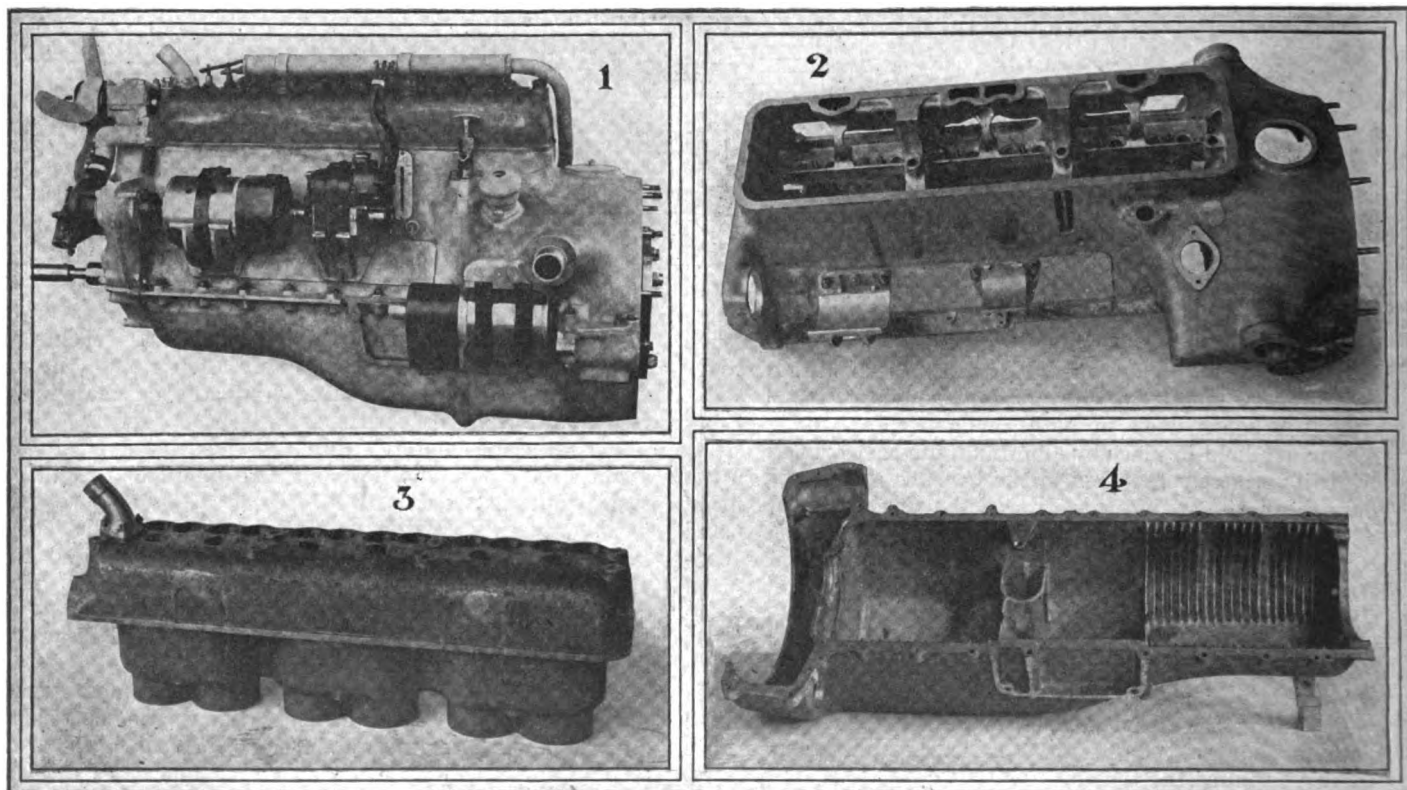
By W. F. Bradley

CONTINENTAL manufacturers brought forward few novelties at the London show. In the cheap car field the most prominent exhibitor was Citroen, who has succeeded, since the armistice, in securing a strong position on the British market. The fact is worth mentioning that Citroen's selling interests in Great Britain are in American hands and the more modern and vigorous methods employed are doubtless responsible in a large degree for the success of this new firm in breaking into foreign territory so quickly.

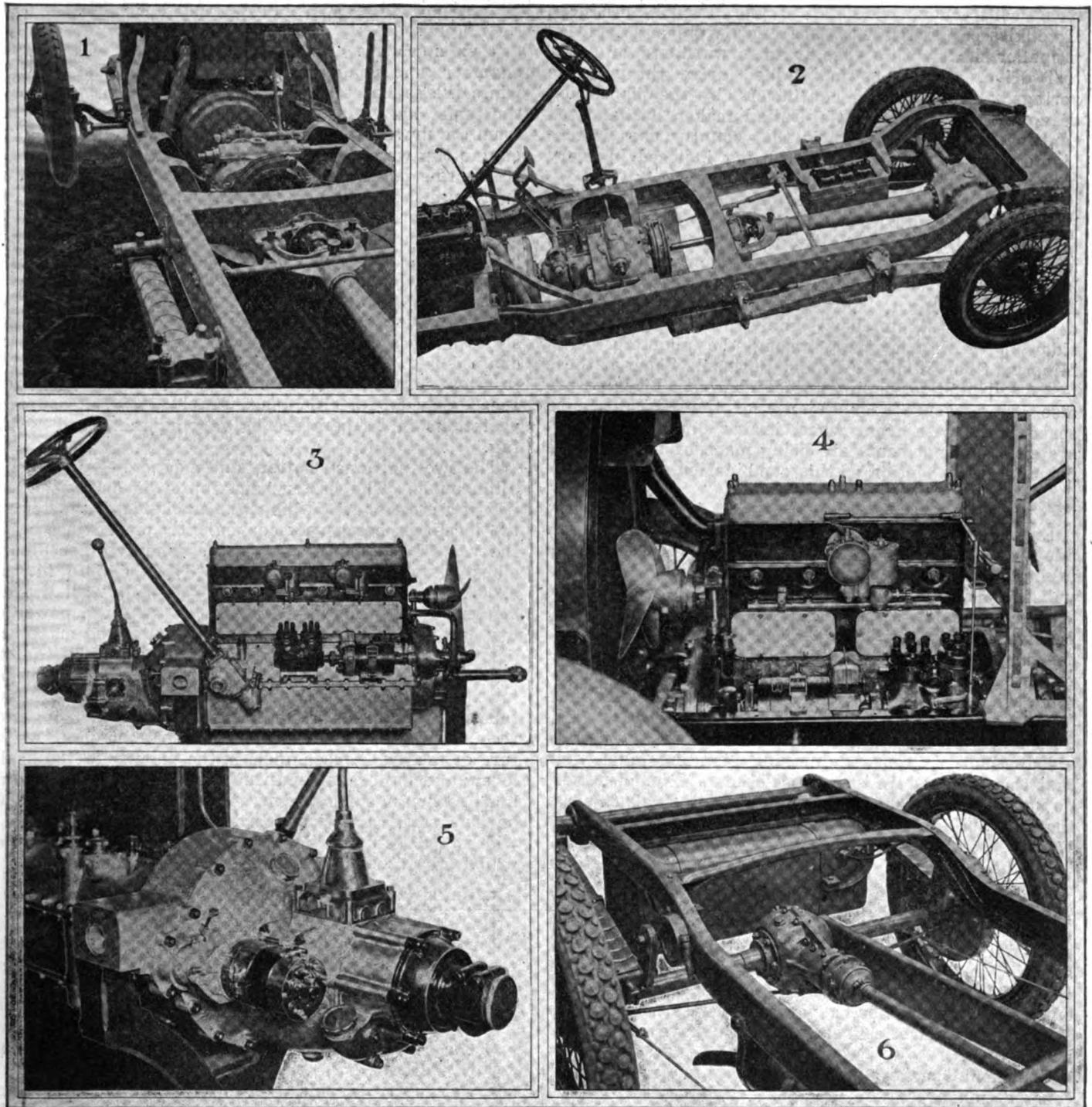
Bellanger exhibited his cheap car built on American

lines. Renault and Berliet each had their popular-priced models seen at last year's Paris show, but they did not appear to attract any considerable amount of attention. It was noted that Lorraine-Dietrich and Bayard-Clement, who have joint interests and who have both laid out cheap production jobs, and had them on show a year ago in Paris, failed to appear in London, notwithstanding the fact that both had selling organizations here before the war.

Some surprise was expressed at the strong Italian representation. With the exception of Itala, who is re-



(1) Spyker six-cylinder engine. Note line drive of pump, generator and magneto. Back of magneto is crankcase scavenging pump and oil filler and breather. Note inclosed fan drive. (2) Top half of crank chamber of new Spyker six-cylinder engine, showing inlet ports. (3) New Spyker six-cylinder block. Note that cylinder barrels set into crank chamber. (4) Bottom half of crank chamber of new Spyker six-cylinder engine, showing internal cooling ribs



(1) Close view of Hotchkiss yoke anchorage of torque tube, showing also cross members supporting gearset. (2) 18/22 Hotchkiss, showing cantilever springs, four-speed gearbox and spiral bevel drive. (3) Powerplant of 35-hp. six-cylinder overhead-valve Gregoire, $3\frac{3}{4} \times 5\frac{1}{4}$ in., with dual Delco ignition, twin carburetors, and sockets in aluminum arms for trunnion supports of rear end. (4) Overhead valve engine of 15-hp. Gregoire ($3 \times 5\frac{1}{4}$ in.). Has Delco dual ignition. (5) Unit three-speed gearset mounting of new overhead-valve Gregoire. Delco starting motor operates through enclosed reduction gear to starter pinion. Rear end of unit supported by tubes extending from arms cast integral with clutch housing. (6) Rear end of Bugatti, showing quarter elliptic spring anchor, friction dampers above axle. The pressed steel torque member has wood filling and solid front end free to slide in hanging bracket on cross member of frame

ported to have abandoned automobile construction, every Italian firm of note had models on exhibition. Fiat showed the three new types designed immediately after the war. Lancia exhibited his four-cylinder and stated that the new twelve, which was the novelty of the last Paris salon, was being held back until more favorable conditions prevailed. Spa showed a new six, and the Isotta-Fraschini company put forward a high-class eight-

cylinder in line, which is just one year late in being produced. The other Italian firms showed the same type as last year.

Continental tendencies are different in many respects from those of Great Britain. French makers in particular are showing a strong preference for cantilever springs, and this in nearly all cases has been accompanied by the abandonment of the Hotchkiss drive. The

most conspicuous example is the French produced Hotchkiss car, which now has cantilevers and inclosed propeller shaft with a yoke at its forward end, and central drive. Unic has maintained drive through the springs, although using cantilevers, by the disposition of double cantilevers. No Italian maker has adopted cantilevers, but no maker in that country uses Hotchkiss drive, the propeller shaft being inclosed in every case and the drive being central.

Another important difference between Continental and English manufacturers is in the use of front wheel brakes, which have been taken up by the former, but do not seem to interest the latter. The present users of brakes on all four wheels are Delage, Hispano-Suiza, Excelsior, Bellanger, Isotta-Fraschini, Darracq and Piccard-Pictet. This number is going to increase very considerably within a year, among the adopters being Minerva, Spa, Unic, D.F.P. and Farman. Some of these firms will fit it to medium-priced chassis. Licenses are also being secured for the use of the Hispano-Suiza servo brake with front wheel brakes under the Perrot system. Arrangements are being made by two or three firms for the adoption of this combination.

Battery Ignition

English manufacturers are very reticent about the adoption of battery ignition, while French makers are taking to this very rapidly, and the number to use it will increase in the near future. At the present time Hispano-Suiza is using Delco on one of the most expensive chassis built in Europe. Darracq has dropped the magneto for its eight-cylinder model; Gregoire has put two new types on the market, one with four and the other with six cylinders, and both have dual Delco ignition. Lorraine-Dietrich has also decided that the magneto is unnecessary. Although these firms form a decided minority, their engineering standing is so high that they are certain to convert others. French makers do not appear to share with their English rivals the fear that the public will object to ignition by generator and battery.

In the matter of detachable cylinder heads French makers have taken a lead on English firms. Italy only remains true to the fixed head if considered on the basis of the number of firms, but is out and out for the separate head considered on quantity production, for all Fiat and Lancia cars have detachable heads, and Fiat alone represents about 75 per cent of the national output. The new Spa, a very high-class six, and the eight-cylinder Isotta-Fraschini both have detachable head.

Continental makers are coming more and more to unit construction of engine and gearbox, this also being a point on which they are not in agreement with English makers. The only Continental cars with separate engine and gearbox are those produced before the war and not modified since. With a few rare exceptions, one of which is the Farman, the post-war Continental productions have engine and gearbox in one unit.

New Features in Spyker

The only absolutely new Continental cars in the show are a Spyker six, a Spa six, an eight-cylinder in line Isotta-Fraschini and the French S.L.I.M. All these are expensive jobs produced almost irrespective of cost. The Spyker bristles with new features. The six cylinders, consisting of the heads, the barrels and the valve guides, form a monobloc casting, which is dropped into the aluminum base chamber, being held to it by eight bolts which support the main crankshaft bearings. The head is not detachable, and carries valve caps, into

which spark plugs are screwed, and holes for a second set of plugs in the center of each cylinder head. The gas passages are cast in the upper half of the base-chamber, and communicate with the cylinder casting, while the carbureter is bolted on the lowest portion of the upper half of the crankcase, and draws all its air from the flywheel housing. On the left-hand side of the engine the water pump, generator and magneto have a single line drive, the pump being ahead of the timing gears and the two other parts to the rear of them. The electric starting motor is on the same side, but bolted to the lower half of the base chamber. Internal ribs are cast in the base chamber for cooling the oil, and another feature is a hand operated suction pump, mounted just back of the magneto, by means of which all the oil can be drawn out of the base chamber. Cooling is by pump, assisted by a four-blade aluminum fan with inclosed chain drive. The fan sprocket is mounted eccentrically, to allow for taking up slack in the chain, and a three-speed gear and a clutch are provided to take care of variations in temperature by varying the speed of the fan.

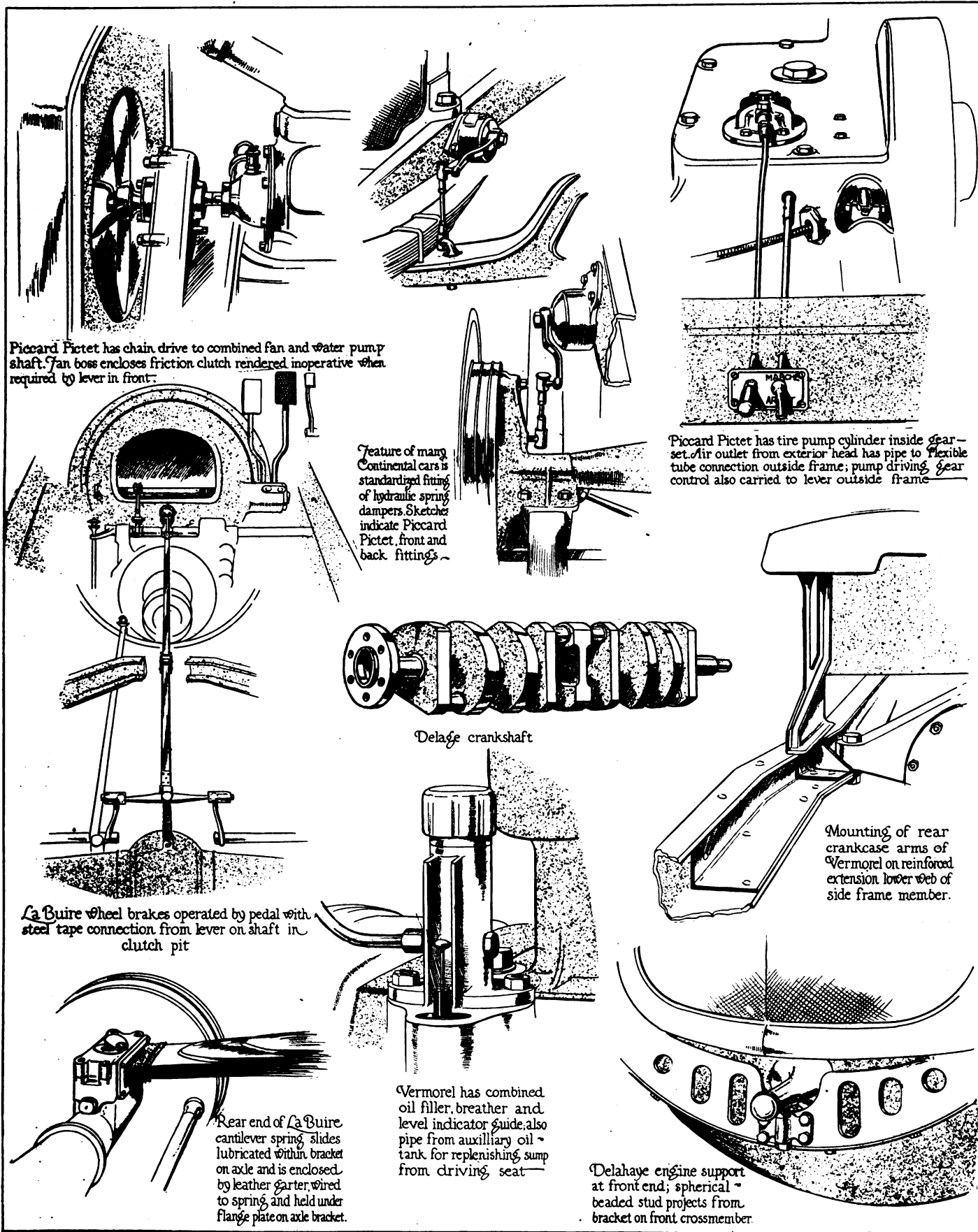
The two ignitions—battery and magneto—operate simultaneously. The battery distributor is driven off the end of a cross-shaft on the right-hand side of the engine, the terminals being very conveniently placed just below the valve stem inspection plates. The cylinder dimensions of the Spyker engine are $3\frac{3}{4} \times 5\frac{5}{16}$ in. At 2200 r.p.m. the engine develops 70 hp., but all the endeavor of the designers has been to get high power at low and moderate speeds, so as to secure the maximum degree of flexibility. Three-point attachment of the engine into the frame is used, the forward attachment being spherical and the two rear ones by means of a heavy tube going through the crankcase housing with its ends received in bearings on the main frame members. A feature of the brake mechanism is the placing of the brake levers and the brake equalizer inside the rear axle housing. Although springs generally have increased in width on European cars, the record lies with Spyker, with a width of $3\frac{1}{2}$ in. for the rear semi-elliptics, the ends of which are not shackled but guided between rollers.

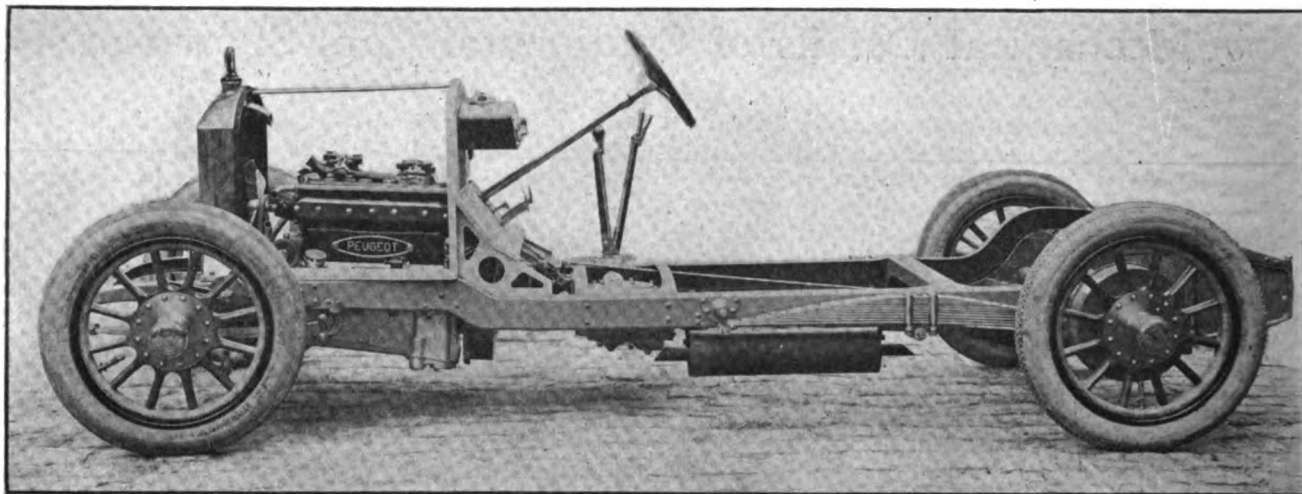
Aluminum Construction in Spa

Unable to complete the car in time, Spa showed the engine of the new chassis only. This is distinctive by reason of an all aluminum construction. The cylinders and upper half of crankcase are a single aluminum casting, with steel liners pressed into the cylinder barrels. A detachable cast iron head is mounted on this casting, and the overhead camshaft is hidden by an aluminum cover. Although the camshaft is driven by a vertical shaft at the front, this is entirely inclosed by an aluminum cover the shape of which continues the lines of the main casting. The water pump is hidden inside this housing, and only two short lengths of copper pipe indicate the presence of a water circulating system. The fan is gear driven off the vertical shaft and is provided with a clutch and flexible coupling. This engine, which is one of the best examples of "clean" design to be found in the show, has 85×120 mm. cylinders. As an indication of the care taken to preserve the clean external appearance, the wires from the high tension magneto, driven from the same front cross-shaft as the generator, are carried through the cylinder head from the right-hand side to the plugs inclined below the valves on the opposite side of the engine, only about a couple of inches of wire being visible for each plug.

This engine will receive a unit gearbox, with change speed lever mounted on top. Details of chassis have not been issued, other than the use of front wheel brakes.

Mechanical Details of Continental Cars Shown at Olympia





16-hp. Peugeot, $3\frac{1}{4} \times 5\frac{1}{2}$ in. engine, four-speed gearbox under worm drive, disk clutch, 122-in. wheel-base. Price, £950

Clean external appearance is the distinctive feature of the eight-cylinder in line Isotta-Fraschini. Although Italian makers have always been famed for the "clean-ness" of their design, there is nothing in existence to equal the Isotta in this respect. The eight cylinders measure 3.3 by 5.1 in., and have their valves in the detachable head with operation by inclosed pushrods and rockers hidden from view by a detachable head cover. The passages for the pushrods are in the cylinder casting, and so neat is the design that it is practically impossible to say, from an external examination, whether the valves are operated by an overhead or a crankcase camshaft. There are two Zenith carbureters placed on the right-hand side and fed from a vacuum tank. For appearance sake, the gasoline feed pipe from the dashboard tank is carried inside the aluminum cover plate hiding the lower portion of the cylinder barrels, so that only the unions and a couple of lengths of pipe, about 2 in. each, are visible. There is a similar arrangement for the ignition wires, which go inside the cylinder barrel cover plate and come out just below the plugs.

Isotta Chassis Details

The crankshaft, with bearings on both sides of each throw, and full circular webs, is a very fine piece of work. Aluminum pistons and hollow connecting rods are used, with an oil tube through each of the latter to the hollow piston pin. Unit construction of engine and gearbox is another new feature. Steering is on the right, with left-hand control. A Yale lock is incorporated with the gearset, so as to allow the gears to be locked when in engagement or in neutral. The rear axle is new, being a banjo-type steel stamping. The propeller shaft is inclosed, the drive being taken through the spherical end of the propeller shaft housing. Spiral bevel gears are used. Isotta-Fraschini was one of the first to adopt front-wheel brakes and has incorporated them in this new chassis. Whereas formerly the front-wheel brakes were operated separately by hand, now all four wheels are braked together, and the braking effort can be applied either by pedal or lever. Every part of the chassis not lubricated automatically is provided with a ball nipple lubricator to which grease is supplied by a screw type gun, on a system similar to that introduced by Alemite in the United States.

Marketed under the name S.L.I.M. is a new four-cylinder chassis produced at Lyons by the firm responsible for the Pilain car. The newcomer, which has 3.5 by 5.9-in. cylinders, with detachable head and overhead

chain driven camshaft, is distinctive by reason of the use of compressed air for engine starting, for operating jacks, inflating tires and applying the brakes on all four wheels. The compressor used is a four-cylinder type of $1\frac{1}{2}$ -in. bore and stroke, driven by the engine with a reduction gear of 5 to 1. The compressed air is contained in two tanks placed at the rear of the chassis.

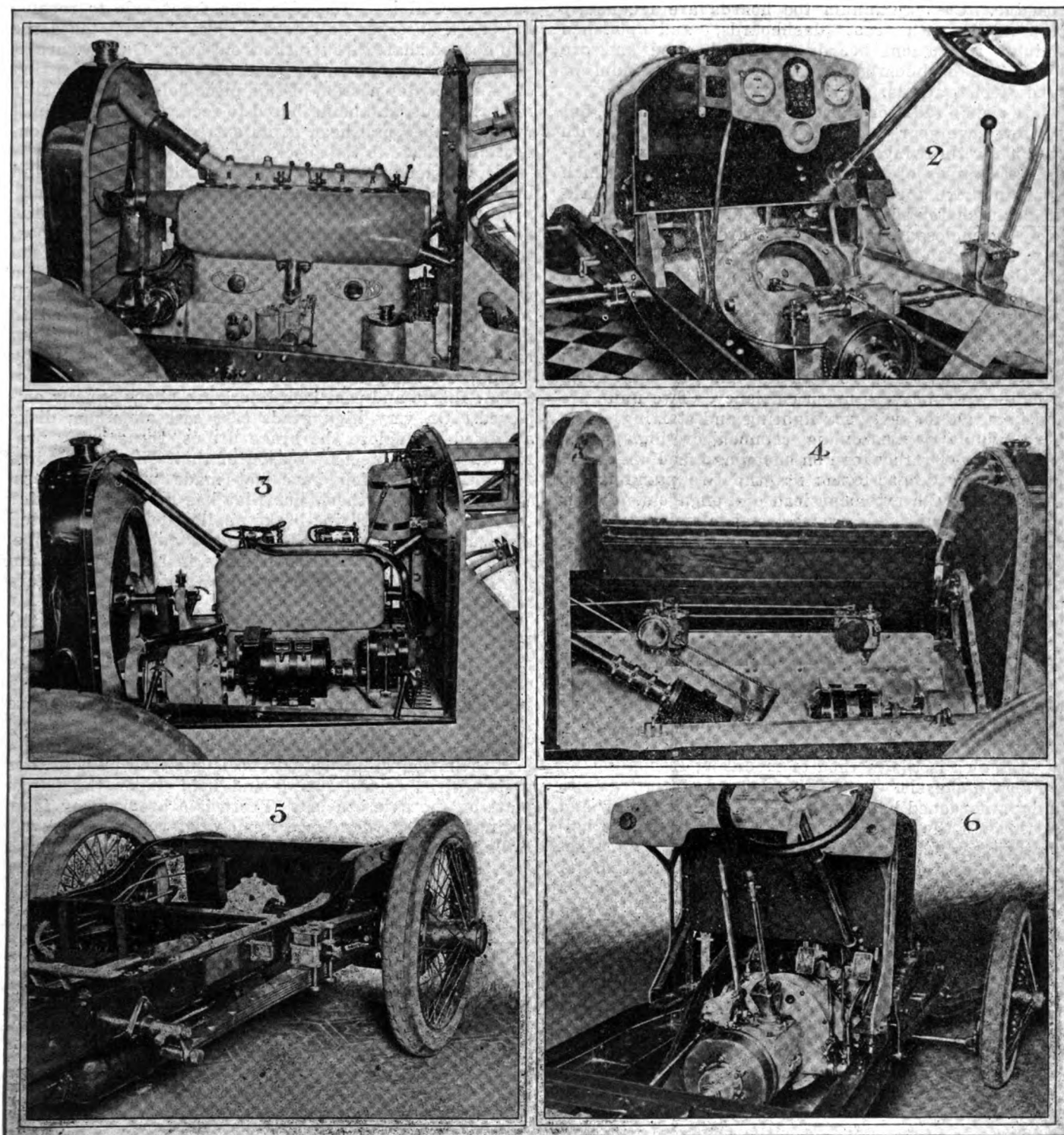
Cylinders and Valves

Exhibits at the London show are distinctive by reason of the immense amount of detail refinement they incorporate. Among the Continental exhibits the cast-iron cylinder is the type most extensively used, the majority having valves on one side and detachable head. The valve-in-head type, however, is making progress and is gaining ground at the expense of the L-head. There is only one example of steel cylinders, this being the high-grade Farman six, which is built on aviation lines with separate forged cylinders formed into a block by being welded to a base plate and to a head plate, a common sheet steel water jacket then being put round the unit. Hispano-Suiza has aluminum cylinders mounted on an aluminum crankcase, while the new six-cylinder Spa is the only one with aluminum cylinders and base-chamber in one casting. Even when a detachable head is used, it is comparatively rare for Continental makers to have cast iron cylinders and crankcase in one. In many cases the reason for this is that difficulty has been experienced in getting satisfactory castings.

In a few cases the push rods on L-head engines are placed inside the base-chamber. An example of this is the six-cylinder Schneider with detachable head. Cover plates on the side of the base chamber give access to the valve springs and also to the camshaft. The arrangement assures perfect lubrication of the valve springs, tappets and valve guides. There is a slightly increased tendency to take the exhaust from the front of the cylinder block, instead of at the rear, so as to avoid heating the driver's seat. The Dutch Spyker and the French Gregoire are two examples of this.

Aluminum Dashboard

Cast aluminum dashboards are becoming very common, not only on high-class but on the medium priced cars. Generally advantage is taken of these castings to get more convenient housing of vacuum tank and other accessories. The new Metallurgique has a recess in the center of the front face of the cast dash into which the



(1) The new 40-hp. F. N. four-cylinder $3\frac{1}{2} \times 5\frac{1}{2}$ in. engine with integral exhaust and inlet manifolds. (2) Open clutch pit and gearset of 14 hp. of (5 x 6 in.) La Buire. Note neat layout of pedal and lever brake coupling. An aluminum instrument board is mounted on wooden dash. (3) Left-side 16-hp. ($3\frac{1}{2} \times 5\frac{1}{2}$ in.) Delahaye L head engine. Has three-point suspension, front extension of crankcase resting upon link attached to bracket of front cross member. Note left rear arm forms magneto bracket. Valves on right depart from usual European practice. (4) Isotta Fraschini 50-hp. eight-cylinder in line $3\frac{1}{2} \times 5\frac{1}{2}$ in. engine has overhead valves, magneto ignition, dry disk clutch, three-speed gearset and sells in England at \$9,500 for the chassis. (5) Vermorel rear springing. Front half of cantilever takes reaction from twin rear sections. Whole unit mounted on trunnion at center. Rear axle has aluminum two-part center with tapered steel extensions. (6) Rear end of Vermorel 12-hp. ($3 \times 5\frac{1}{2}$ in.) unit powerplant, showing spherical jointed gearshift lever operating in four-speed gate, cast aluminum dash bracket and instrument board

circular section vacuum tank is fitted. The new Bignan Sport, not shown in the exhibition hall, has a ledge cast with the dash into which the vacuum tank and a reserve oil tank are mounted. Voisin mounts the vacuum tank

through the cast dash. Spa has a wood dash faced with sheet aluminum on the engine side, and on it a door opening into a compartment containing ignition switches and terminals, which are thus out of sight but perfectly

accessible. Cast aluminum toe boards are frequently incorporated with cast dashboards, and polished aluminum instrument boards are much used and are held to the dashboards by either cast aluminum or forged steel brackets.

There are no radiator shutters on Continental cars, but not a few have gear or enclosed chain driven fans, with a clutch for throwing this out of engagement when desired. Examples of this are the Piccard-Pictet, which has chain drive for the combined fan and pumpshaft, with a clutch for the fan. Spyker drives the fan separately by enclosed chain, but has three speeds in addition to a clutch. Minerva has belt drive of the fan with a clutch. Spa is another example of positive driven fan with clutch.

Nearly all electric generators are positively driven on Continental chassis. Belt drive is not favored for this unit, although commonly seen on English machines; some of these latter drive both fan and generator from one belt—with not very much efficiency. Two units are in an immense majority for lighting and starting.

Tire pumps are becoming common on high grade chassis, but are rarely seen on cheap and medium priced productions. Piccard-Pictet fits the tire pump inside the gear box, with extension lead and engagement lever brought to the left-hand frame member and covered by an aluminum housing. Minerva has the tire pump driven off the engine. Farman places this unit inside the gearbox, similar to Piccard-Pictet. No accessory manufacturers make standardized tire pumps ready to be fitted to the chassis. Each maker has his own type, and cost is increased thereby.

Shock absorbers are being considered more and more as an essential part of the chassis, and are being correctly mounted by manufacturers. There are many good examples of axles and frames specially designed to receive a particular type of shock absorber. One of the best examples is the method of mounting Houdailles on the Farman chassis. Connection is made from frame to axle by a hardened ball, the stem of which is hollow and goes through the axle. Advantage is taken of this hollow stem to send grease through to the ball and socket connection of the shock absorber connecting rod. A similar arrangement is adopted for the rear. Minerva

has a special boss forged on the front axle to receive the shock absorber ball head. Piccard-Pictet takes the ball headed shaft through the front axle. On the Turcat-Mery there is a distance piece between the two spring clips, the center portion of this piece being much thicker than the ends, and being bored to receive the short shaft with hardened ball head at its extremity, by which connection is made to the shock absorber.

A lot of good detail work has been done on brakes and brake control. There are no external brakes on Continental cars and very few with exposed shoes. With the adoption of unit construction of engine and gear box, the tendency is to drop the transmission brake and take all the braking effort through the rear wheels. Delage retains the transmission brake although braking on all four wheels, but this brake is really only intended to hold the car in a standing position. Die cast aluminum brake shoes are common, being used, among others, by Voisin, Farman, Panhard, Delage, Darracq, Hispano-Suiza; fabric and cast iron liners are about equally employed. On very high grade cars cast aluminum disks are used to enclose the brake drums, these being preferred to sheet steel by reason of their silence. Cables for brake operation have not made much progress. Voisin maintains them, but Fiat has dropped them for rods. Steel "tapes" for brake application find a limited application, being used by Panhard and by La Buire. Some very fine work has been done in brake connection layouts so as to secure easy adjustment with neatness and absence of rattle.

Continental manufacturers have not yet adopted the English practice of fitting leather or rubber gaiters to their springs, although there is no doubt these add to the comfort of the car. There is a slight break away from the rolled eye on the extremity of the spring. La Buire has the cantilever spring attached to the axle by means of a flange plate within which it is free to slide. This part is efficiently lubricated and is enclosed by a leather gaiter wired to the spring and held under the flange plate on the axle bracket. There is a break away from springs with a very large number of very thin leaves. Rolls-Royce in England and Darracq in France employ a few thick leaves, the main leaf running as high as 9/16 in. in thickness.

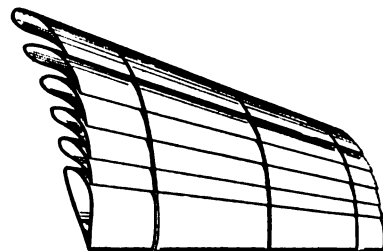
A New Aircraft Wing

FOR some months there have been frequent references in the British aircraft press to a new wing invented by Handley Page, the well-known aircraft designer. No detailed information regarding the form of the wing was issued until recently, owing to pendency of foreign patent applications, but on Oct. 21 a public demonstration was held, to which representatives of the press were invited.

In its fully developed form the Handley Page wing consists of a plurality of winglets combined into a single wing in Venetian blind fashion, as shown by the illustration herewith. The slots in the wing virtually convert a single wing into a number of wings and multiply the lifting power two or three times, it is claimed. This is said to be especially the case when the angle of incidence of the plane is steep. In the ordinary type of wing if the angle is increased a point is reached when lift is lost, and this is known as the "burble point." In the Handley Page wing the air flowing through the slots

maintains the lift on the top surface of the plane, from which the greater part of the lift is derived even when plane meets the air at very steep angles, such as 45 deg.

The wings of the plane with which the demonstrations were made had only a single winglet, placed in front of the regular wing, with an air passage between the two. Mr. Handley Page said that the plane with the one slot had a lift 55 per cent higher than the ordinary plane, and that the DH-9 so fitted, and carrying a load of 3600 lb., got off in 70 yd., whereas the ordinary DH-9 took 170 yd. to get off with a load of 3100 lb. With the full "venetian blind" system the lift was increased 300 per cent.



The Handley Page wing

Keeping an Accurate Check on Gages

Quantity production demands accuracy in manufacture, and accuracy depends primarily on constantly true gages. The following article describes the way in which one automobile plant checks its gages against an accurate set of master gages. Systematic checking a matter of routine.

By J. Edward Schipper

ACCURATE gages are a requisite for accurate manufacture. Close limits mean nothing if the gages against which they are checked are not themselves beyond question. It is impossible to maintain gages accurately without persistent, careful, systematic checking against a thoroughly reliable master set.

Quantity production calls for accuracy in manufacture, because as soon as a large number of a certain product is turned out, it becomes necessary to furnish service parts; and in order that these may exactly fit the parts produced originally, it is necessary that the dimensions be accurate. Furthermore, in quantity production it is desirable to eliminate the need for selection in the assembly processes. That is, people in the assembly room should be able to take units at random and put them together without trouble. This means accurate workmanship and exactness of measurement. In the case of very fine products, this accuracy of fit and measurement goes even beyond what is required for interchangeability and becomes a very definite factor in the life and performance of the product.

In the manufacture of its automobiles the Lincoln Motor Co. is making use of the same methods of maintaining accuracy as were employed in the manufacture of Liberty airplane engines for the Government. In the Lincoln car there are 5000 operations on which the tolerance is only 0.001 in.; on 1200 the tolerance is 0.0005 in., and on 300, 0.00025 in.

To maintain this high standard of accuracy, the tool inspection department carefully and systematically checks its gages as a matter of routine. This checking of the production gages is essential to obtaining the closeness of workmanship required by the drawings. The manner in which it is carried out makes an interesting story of precision in modern commercial production.

In setting tolerances for the manufacture of this product, no attempt was made to exceed practical requirements. The finer the tolerances are made, the more costly becomes the process of manufacture, and it would be unreasonable



Testing a thread gage by the three-wire system on the Prestwich fluid gage. This check is verified by Johansson blocks, which are shown in the foreground of this illustration

to request the buyer to pay for more accuracy than sound manufacturing economics demands. But where accuracy returns a dividend, no effort is spared to narrow the tolerances. For instance, on some parts of the Lincoln motor, particularly the wrist pin, a deviation of 0.0003 in. is the limit.

It is the function of the tool inspection department to see to it that the inspections in the shop are correctly made. In the tool inspection room are a set of Johansson blocks to which everything is checked back. These blocks are the basic standards for the entire plant and do not leave this room. Field men inspect the gages in use in the various manufacturing departments. These field men, as a matter of routine, go from department to department, checking, by means of a field set of Johansson blocks, the gages in these departments. The routine work is so laid out that every department is visited at least once every two days. Some departments, in which the gages are put to service in which rapid wear may be expected, are visited every day. When a field man finds a gage which has become worn or distorted to a sufficient degree to require

<small>Circle out words that do not apply</small> FOREMAN - WORN OUT - BROKEN 1 S. R. ATT. - DO NOT REPL. - REPLACE					T. S. R. NO. C-12 NO	
Form 834 ORIGINAL—To Tool and Supply Service Department LINCOLN MOTOR COMPANY SPECIAL TOOL CHECK RELEASE						
Quantity	Price	Value	Tool No.	Dental No.	DESCRIPTION	
Insp. O. K. Employee No.			Foreman			
Date		DO NOT USE THIS SPACE				

Form of tool release used at the Lincoln Motor Co.



To the left—Inspector checking a piston pin with snap gage in production. To the right—Checking by means of a Johansson plug the snap gage used for inspecting piston pins

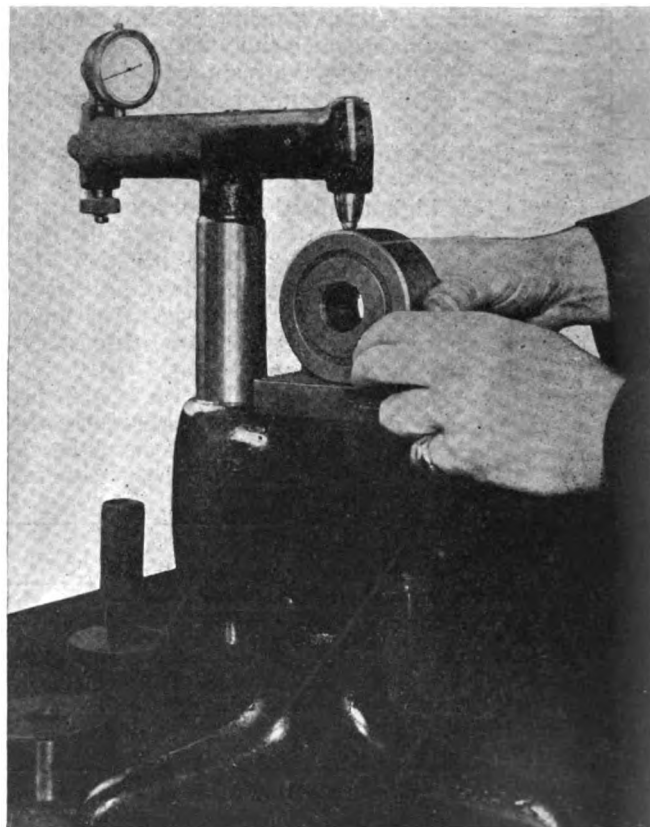
replacement, he withdraws the gage from production by means of a tool release form, and another one is issued immediately in its place.

In making the rounds, the field men go first to the tool cribs, to make certain that the gages in these cribs, which are issued against tool checks, are correct. Fixed gages not falling within the allowed limits for these gages—which, of course, are much closer than the limits for manufacture—are scrapped. Adjustable gages are brought to the tool inspection department for correction and resetting. After checking up the gages in the tool cribs, the gages in the manufacturing departments are checked in the same way, and when one is withdrawn for scrapping or adjustment, the replacement gage is issued from the tool crib. It is the duty of the crib man to have gages on hand to

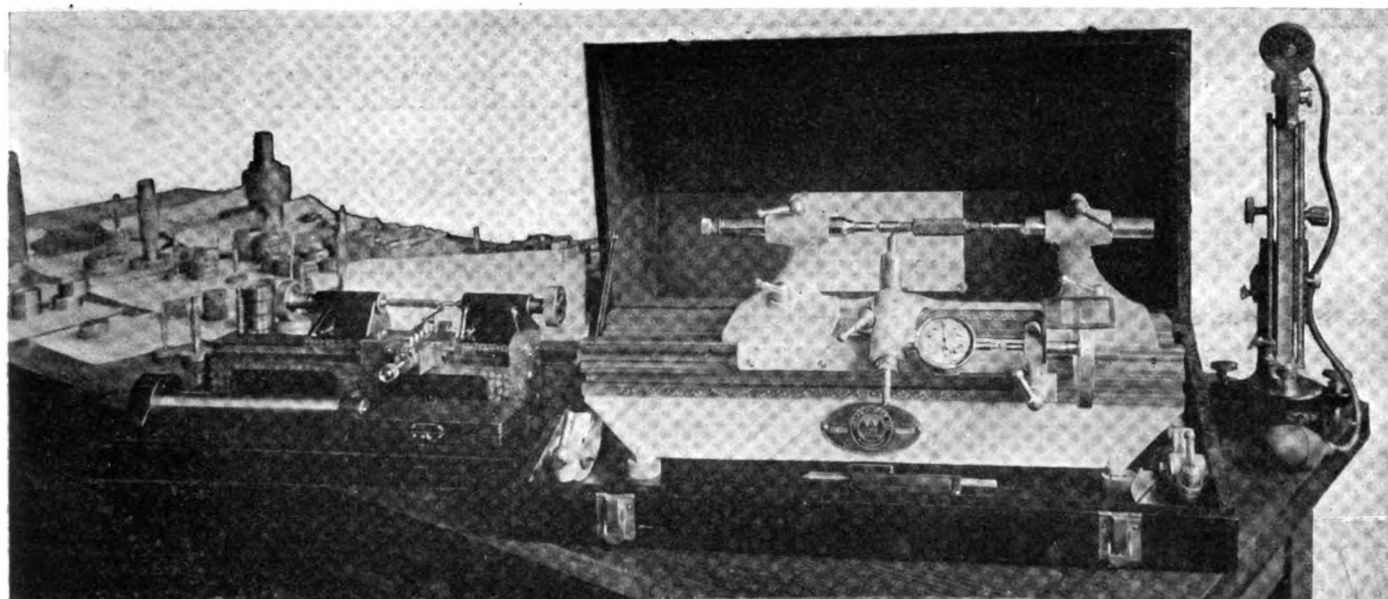
replace those which may be withdrawn by the tool inspection department field men.

The gages are not reset by the field man's blocks, but are reset from the master blocks in the tool inspection department. The Johansson blocks in possession of the field men are used simply to check the gages on the job, and all resetting is done in the tool inspection department against the master blocks. The Johansson blocks used by the field men are checked monthly against the master blocks in the tool inspection room.

The work of resetting the various gages is carried on under the eye of the chief tool inspector and requires the highest degree of accuracy and the use of the most delicate and accurate measuring machinery. In measuring the thread gages, the three wire system of checking the



To the left—Checking a piston on the standard inspection gage used in production. To the right—Checking by means of a master plug gage the piston gage used in production. The master gage is checked back against Johansson blocks



Testing the pitch or lead of a thread gage on a West & Dodge instrument. The smaller instrument to the left is a Sheffield Machine Co.'s gage for the same purpose

pitch diameter is used. For pitch diameters above $1\frac{1}{2}$ in., the Prestwich fluid gage is used, and for smaller diameters, the micrometer. A three wire test on the thread gage as carried out on the Prestwich gage is shown in the accompanying illustration. The three wire method, with which all tool men are familiar, consists of taking three wire-like plug gages, placing two in the Vs formed by adjacent threads at the bottom and one in a V at the top in the same vertical plane, and then taking a measurement over the wires by a micrometer or other instrument. These standard wires are of such diameter that they enter the V to the level of the pitch circle and thereby provide a means of measuring with micrometer or by the fluid gage, as described, the deviation from the nominal pitch diameter. This diameter is checked against Johansson blocks of the same measurement, so that even though a micrometer which is a trifle out of adjustment be used it would not cause any inaccuracy, because it is checked against the Johansson block.

In checking these thread gage diameters on the Prestwich fluid gage, the instrument is first set by the Johansson block. The thread gage is placed under the instrument, and the fluid column should then give the same indication on the ten-thousandths scale as when the block was under the instrument. The limits of variation allowed on the working thread gages are plus or minus 0.0003 in. up to $11/16$ in., and plus or minus 0.0004 in. on working gages above $11/16$. This applies to "go" gages. On no-go gages the limits of variation are 0.0001 in. less.

'Go and no-go snap gages are checked directly against the Johansson blocks, as are all other gages with which this can be done. Special inspection gages or gage fixtures are checked back against the Johansson blocks. For instance, micrometers may be used, first on the Johansson block and then on the gage, or Johansson round plugs may be used.

A very interesting example of checking gages is afforded by the piston pin snap gage which is a go-and-no-go type by which the tolerances on the piston pin are held within 0.0003 in. Owing to the very small tolerances on this job, it is necessary to check these snap gages every day. Instead of a square Johansson block, a cylindrical Johansson plug is used for checking this gage, because it has been found that with a snap gage the continual rolling-in and rolling-out of the piston pin will eventually cause an irregularity or waviness in the gage surface, which would

not be perceptible to the human eye and could not be detected by the Johansson block, which would touch only the high spots. When being rolled-in, a piston pin may conform to the irregularity in the surface of the snap gage, and while the square Johansson blocks would show the gage to be accurate, it is actually out and gives inaccurate results. By using the cylindrical Johansson plug, the conditions in testing the gage are similar to those in testing the piston pins, and it is consequently impossible for any inaccuracy to go undetected. The production check and the gaging check are illustrated herewith.

For checking the lead or pitch of screw gages, the lead gage made by the Sheffield Machine Tool Co., of Dayton, Ohio, is employed, using the Johansson block for setting. In other words, the machine is not the gage, but simply the means for translating the check from the thread gage back to the Johansson blocks, which are employed for checking the accuracy. On larger size threads, a somewhat similar instrument made by West & Dodge, of Boston, Mass., is employed.

Another method of checking the accuracy of thread gages is to make a mold or casting from the threads and project it, enlarged fifty times, upon a screen. A special instrument is used for projecting this, the casting being made with some core checking compound such as that made by the Arthur Knapp Engineering Corp. of New York City. This, of course, applies only to the internal threads which cannot be projected directly. An external thread can be projected without making a mold.

The machines and devices in the tool inspection departments are simply the means for checking the various gages against the Johansson blocks, and are not actual measuring instruments in themselves. In other words, these instruments, rather than giving a direct reading of the dimension involved, show only the difference between the master Johansson block and the gage tested. The readings are generally in ten thousandths of an inch.

By making the testing of manufacturing gages a routine process, with a definite schedule for the field men to cover, there is no chance for the production gages being out of true for any length of time. Since additional checks on the gages in the form of departmental checks are going on all the time, and all of the manufacturing gage operations are continually being referred back to the master gages, the Lincoln Motor Co. is assured that the limits set upon its drawings are being rigidly adhered to.

How One Large Firm Trains Its Sales Representatives

A twelve-weeks' course provides efficient salesmen for a large truck and tractor firm. Many of the ideas comprised in that course offer possibilities for adaptation elsewhere on a smaller scale. Special interest attaches to this article because of the present need for intensive salesmanship.

By Norman G. Shidle

WHATEVER the cause for a general business depression, the trouble in any particular case can usually be traced to the simple statement "Lack of sales." For this reason merchandising and selling effort is coming in for more intensive study than has been accorded it for a number of years. It is being recognized that many salesmen who might profitably be kept on the pay-roll as order takers during a period of business inflation must either be made into real business getters or become a liability to the organization.

In this situation many manufacturers are turning to methods of training salesmen so that their work may be improved, their efforts rendered more effective and the services be of greater ultimate value to the management. And in this process of training good salesmen the opportunity of training future organization executives is not being lost to view. Both these aims, at least, are comprised in the twelve weeks' training course for salesmen conducted by the International Harvester Co.

The course is designed to train men as general salesmen for the products of this company. Later they may become specialists for a particular line, but the aim of the training course is to make them capable of selling all of the various products—trucks, tractors, farm machinery, etc.—produced by the company.

The International selling organization is divided into five districts, each covering a definite part of the country. Each training course includes 25 men, five from each of the various districts. Great care is exercised in choosing the men who are to take the training, since the cost is large enough to necessitate a definite return on the investment made. The entire expense of the course, with the exception of salaries, is borne by the main organization.

Qualifications Necessary

Each branch manager is allowed to recommend to the district manager men to be sent from his branch. The men recommended, however, must have been employed at the branch at least three months before they are eligible for the training course. This is necessary that the man may have a general idea of how the branch organizations operate, what are the chief problems to be met with in the field, and have enough background to be able properly to absorb the material presented in the course. From the men recommended by the branch managers, the district manager selects the five men from his district who go into the training course.

Additional qualifications are that the man must be between the ages of 21 and 26 years, be in good health, of good character and habits, and of pleasing personal ap-

pearance and address. A high school education is required, but a good proportion of those taking the course have had a college education or its equivalent. It is desirable, though not essential, that the applicant have some practical knowledge of farm life and a college course in agriculture.

Objects of Course

The chief objects of the course may be listed as follows:

1. To strengthen the personnel of the sales department.
2. To raise the standard of salesmen.
3. To interest young men in the business to the extent that they will consider their connection with the company permanent.
4. To eliminate those who seek temporary employment while they look around for something they consider better.
5. To give the salesman sufficient preparation so that he will have a fair chance to make good.

The machines studied during the course are included in the following list.

Tractors	Corn pickers
Trucks and Wagons	Corn binders
Engines	Corn shellers
Primrose cream separator	Feed mills
Grain binders	Ensilage cutters
Mowers	Tractor hitches
Reapers	Threshers
Rakes	Planters
Sweep rakes and stakers	Cultivators
Hay loaders	Spreaders
	Plows

As indicated in the outlined objects of the course, however, an attempt is made to give the men much more than merely a working knowledge of the various machines which they are to sell.

The first day of the course is spent in the general office sales department. After the necessary preliminaries of enrollment and introductions have been completed the entire class is addressed in short talks by several executives of the organization. These talks vary with each class, but include such subjects as "The Growing Demand for Leaders," "Thoroughness and Honesty in Business," "From Raw Material to Finished Product."

The next two days are occupied in giving the students a general introduction to agriculture. This is done under the auspices of the agricultural extension department. By means of a series of lectures, the importance of agriculture, many of its most important functions and operations, and the place of the organization's products in agriculture are presented.



Group of students hearing practical lecture during period spent on the farm

Beginning at this time the 25 men are divided into five groups, each of which contains the five men from a particular district. These five groups receive separate instruction on all practical work throughout the course. This enables each man to not only see very closely how everything is done, but also to have the opportunity of performing most of the operations himself.

Three days are spent in the study of wagons and wagon trucks. A general survey of the wagon plant under the direction of an instructor for each group is followed by a general lecture on the subject. Finally, the students themselves are required to tear down and set up the wagons.

Practically two weeks are spent on a farm. During this time the students are made thoroughly familiar with the uses and operation of the various pieces of farm machinery. They are required to become proficient in setting up and operating the machines; they learn the names of the various parts and understand how the machines are put together. The accompanying photograph shows a group of students under instruction.

A specified length of time is devoted to each machine. Tractors and plows, for instance, are studied for three days. In each case the instruction on a particular unit is under the direction of an expert on that particular implement or machine. Most of the expert technical men of the organization are utilized as instructors at some time during the course.

During the two weeks on the farm the students live in barracks. In this way they get together and become thoroughly acquainted with one another near the beginning of the course. An excellent opportunity is thus presented of making the group feel that it is really a unit; that every member of it is an integral part of the same organization; that they are all working for the same end.

The next week, following the actual farm experience, is spent in the West Pullman works of this company, where planters, cultivators, spreaders and other farm implements are manufactured. A specified length of

time is spent in inspecting the manufacturing processes in each department of the plant, and each group is required to set up all the most important implements. The practical experience is interspersed with lectures pertaining to various angles of the work which is actually being done at the time.

During the following thirteen days binders, reapers, mowers, rakes, etc., are studied at the McCormick works, where these implements are manufactured. The work during this time is very similar to that of the preceding week just described, the only difference being in the machines studied and set up. Still other types of implements are studied during nine days at the Deering works.

The most important studies during the next ten days spent are the tractor and the internal combustion engine. The Titan tractor is studied at the Milwaukee works and the International in Chicago. Each day approximately seven hours are spent at the plant. From 3.30 to 4.30 each day a lecture is given on engines and tractors. The course in tractors and engines is particularly thorough, having in the process of development and operation for sometime previous to the installation of this entire training course.

Each of the five groups covers certain departments at certain times, so that it is possible for each group to thoroughly understand the entire plants and the various operations within the time limit set.

The originating and development departments are covered during the first day in Milwaukee. These departments include the pattern shops, foundry, forge shop, die sinking, sheet metal and stamping departments, pulley and steering device assembly, repair departments, heat-treating department, stores department, etc.

Among the departments covered on the second day are the following: New tools department, automatics, erecting International engines, parts assemblies for engines, etc. The third day covers chiefly assembly departments, while the finishing and shipping departments are studied on the fourth day.

An entire day is given to engine and tractor tests. The students are shown the way in which engines are tested and instructed in methods of determining defects and troubles. Three days are devoted to the Chicago tractor works where the International tractor is studied.

The course of lectures on the internal combustion engine and tractors which is given during this time begins with the simplest fundamentals and carries the student by means of explanations and charts through to the more difficult phases of engine design and operation. An outline of the chief subjects covered in these lectures will show in a general way the ground that is covered:

1. Development of Internal-Combustion Engines.
2. Basic Features of Internal-Combustion Engine Design.
3. What Is Going On Within the Engine Cylinder.
4. Classification of Engine Parts by Functions.
5. What Each System Must Accomplish.
6. Liquid Fuels for Internal-Combustion Engines.
7. Getting the Most Power Out of Fuel.
8. Lubricating Oils and Compounds.
9. Tractor Requirements.
10. Plowing Speeds.
11. Materials Used in Engines and Tractors.
12. Processes in the Handling of Metals.
13. Overloading a Tractor Is Poor Practice.
14. Cold Weather Hints.
15. Storing and Overhauling the Tractor.
16. Engine Troubles Classified.
17. Miscellaneous Tractor Information.
18. Plow Adjustments, Care and Operation.

Truck Study Thorough

The final week of practical work is spent in the motor truck factory at Akron. The work here is begun with a short talk describing the truck plant, its functions and the relationship of sales to manufacturing effort. The same practical type of instruction and experience is given in connection with motor trucks as with tractors. The work at this plant is taken up in the following order:

1. Laboratory Tests.
Including fatigue tests, axle test, front wheel spindles, and spring test.
2. General Survey of Machine Shops.
3. Magneto.
Including construction, adjustments, wear, trouble location, makes used.
4. Carbureter.
Including types, carburetion, construction, adjustments, and effects of weather and altitude.
5. Engine Assembly and Test.
Including various stages of assembly units, fitting of bearings, tolerance, timing of motor, motor test under actual load.
6. Transmission Assembly.
Including assembling of units for transmission tests, functions and misuses.
7. Differential Assembly.
Including demonstration of differential workings, tests to secure proper alignment and adjustments, making adjustment, and instruction of how to remove component parts.
8. Steering Gear.
Including particular design used on International truck, strength, ease of operation, and adjustment.
9. Final Assembly.
Including rear axle, springs, steering gear, motor, transmission, clutch adjustment, paint and trim.
10. Final Test and Inspection.

The students are also made thoroughly familiar with the work of the repairs department, the procedure as to returned goods, the activities and function of the service station, the work of the road engineers and repair men.

Before returning for two days in the general offices, a brief inspection trip is made to a steel factory, where the students become familiar in a general way with the manufacture of steel.

The course winds up with two days in the general offices, a certain amount of time being assigned to each department. The heads of the various departments explain to the students the functions and activities of the different branches of the work and familiarize them with the general operation of the various departments of the home office.

Rigid Examinations

The work is very intensive at every point of the instruction. To insure real work on the part of the students, an examination is given at the end of each week. This examination covers in each case the work covered during the previous week. In this way the student is practically compelled to pay close attention to the work at hand, make intelligent notes and understand thoroughly all the instruction that has been presented. The examinations sometimes take as long as five hours to complete, although the average is about two hours. To illustrate the type of examination, a few selected questions are given from the fifty asked after the week in the truck factory:

1. Name five (5) principal conditions upon which depend the proper functioning of a motor.
2. Name five (5) reasons why motor overheats.
3. Name five (5) reasons for loss of power.
4. In fitting new pistons how much clearance should piston have in cylinder?
5. How much clearance should new piston rings have?
6. What is the relation of the speed of the magneto to the speed of the crankshaft in a four-cylinder, four-cycle motor?
7. What method should be employed to determine whether or not high-tension magneto is performing its function when motor fails to start?
8. How many adjustments are there to the differential? Name them.
9. What type of final drive is used on all models of International motor trucks?
10. Name at least five (5) advantages to be derived from use of this type of axle over the worm-driven type.
11. How many dollars' worth of repair parts should be sold to the dealer in connection with his contract?
12. What one branch or phase of our work is of the most vital importance to future of the motor truck business?
13. Name the advantages that the branch house record card, form C-2423, is to the truck owner and company.
14. What is your conception of the duties of a road engineer and what benefits will be derived from his work?
15. Why will our service policy appeal strongly to both truck owners and dealers or distributors?
16. What benefits are to be derived by the manufacturing, engineering departments and by you personally in the field from the proper functioning of service policy as outlined in Bulletin No. 12?

The course has been in operation long enough to be judged entirely successful, although slight changes and improvements are still being made as experience dictates. It has been found of very great benefit to the morale of the organization, both in providing enthusiastic field representatives and in increasing the co-operative spirit between the various branches and units of the company.

A NUMBER of American-built motorcycles were in evidence at the recent Olympia motorcycle show in England. Among the American machines on exhibition were the following: Harley-Davidson, Indian, Reading-Standard, Henderson. The workmanship of the American machines received favorable comment in several British journals. Motorcycle, for instance, says of the Reading-Standard: "It is more up-to-date than many of the British machines in that mechanical lubrication is fitted."

Secretary Meredith's Highway Program

In the annual report of the Secretary of Agriculture is set forth the need of a continuation of action on the Federal Highway program. This need is based on the necessity of adequate transportation.

IMMEDIATE consideration should be given by Congress to plans for extending the Federal-aid road-building program, the period for which by the original act, as amended, terminates with the close of the present fiscal year, declared the Secretary of Agriculture in his annual report to the President. In order that there may be no halting in the work it is hoped, he said, that the Congress will, at its next session, provide additional funds, to be expended under the terms of existing legislation with certain modifications, at the rate of \$100,000,000 a year for a period of five years, beginning with July 1, 1921.

Future legislation, the Secretary said, should not disturb the principles embodied in the act of 1916.

"The principal modifications in mind relate to the problem confronting the Western States in highway work because of the existence in many of them of large areas of public lands, and to the maintenance of Federal-aid roads by the State highway agencies rather than by the counties. The Association of State Highway Officials, at its meeting in December, 1919, unanimously approved the continuance of the present plan of Federal participation.

Need for Prompt Action

"The fact that the present appropriation may not be entirely expended by June 30, 1921, does not lessen the necessity of immediate action. Both the Federal and State highway departments should know, as promptly as possible, the program for the next five years, in order that the work may be adequately planned and the engineering and administrative details carefully executed. Forty of the State legislatures will be in session this winter, when it will be necessary for them to make the requisite provision for meeting future Federal apportionments. From every standpoint, therefore, it is essential that legislation for the continuance of the program now under way be promptly enacted.

"Provision should be made also for the continued building, on an adequate scale, of roads within or adjacent to the national forests. The forest road systems are very closely related to those of the States, and the major forest projects form important links in essential State and interstate highways. There are approximately 15,000 miles of roads within the forests which connect with State and county highway systems. The building of forest roads, therefore, is an important part of the general road development plan of the West, both within and without the forest areas. In addition, the transportation of forest products, the protection and administration of the forests themselves, and their utilization for recreational purposes are all dependent upon the construction and maintenance of serviceable roads."

Good Progress Made

In view of the abnormal conditions which have prevailed since 1916, the report stated the progress that has been made in placing a large highway improvement program under way is surprisingly good. In the three years,

1917, 1918 and 1919, there were approved 677 projects, calling for the construction of 5790 miles of road and involving a total cost of \$56,418,673, of which the Federal share was \$23,931,618. During the fiscal year 1920, 1670 projects submitted by the States, involving the improvement of 16,670 miles and a total allotment of \$109,830,366 of Federal funds, were approved. At the end of the year 14,940 miles of Federal-aid roads, on which \$103,925,094 of Federal funds had been allotted, were under consideration and in various stages of completion, while 1677 miles had been entirely completed. Preliminary engineering investigations have been made on 4003 miles of forest roads and construction has been completed, or is in progress, on 1300 miles.

The work of actual construction has suffered from several causes, which varied in intensity in the different States. They include:

- (1) The difficulty of securing transportation facilities for road materials.
- (2) The lack of materials, particularly cement, steel, and culvert pipe.
- (3) The lack of available contractors and labor.
- (4) Difficulties experienced in disposing of road bonds.

In order to provide for the full correlation of the work of the department and of the State highway agencies, the advisory board has been enlarged to include all the members of the executive committee and the officers of the Association of State Highway Officials.

Transportation an Acute Need

"It required a great national catastrophe to awaken the American public to the inadequacy of our transportation facilities and to the fact that we must depend largely upon our highways, in conjunction with motor vehicles, when a sudden expansion in transportation is essential," said the Secretary. "Our experiences during the last three years have clearly demonstrated that the failure earlier to inaugurate a sound road-improvement program has retarded the effective development of one of our most vital national requirements. The use of the motor vehicle for highway transportation has increased tremendously within a short period. In 1906 only 48,000 motor vehicles were registered in the United States. By 1914 the number had risen to 1,700,000, while the registrations now total nearly 8,000,000, exclusive of motorcycles. The actual vehicle-mile use of our roads, it is estimated, has increased more than 500 per cent in strictly agricultural communities and more than 1000 per cent near the larger centers of population. These figures indicate the extent to which community and short-haul transportation will be served by better highways."

The Federal-aid road act of 1916, as amended, has resulted in putting in motion a great program of highway development, nation-wide in its extent. The original act appropriated \$75,000,000, extending over a five-year period, for the construction of rural post roads in co-operation with the States.

Systems Likely to Overshadow the Individual in Labor Discussions

Suppose that you substituted the name of an employee of your factory for the word "labor" in all of your conversations and discussions regarding industrial relations; how long would it be before you ceased to have an abstract problem and reached an understanding with the individuals?

By Harry Tipper

THERE are two phases in the discussion of the labor problem which threaten to overshadow the problem itself, so that the actual factors which enter into the problem are absorbed thereby. It seems impossible for us to hang on to the idea that human difficulties and grievances arise out of the individual attitude in the first place, and that it is only when the individual attitude is changed that the mass problem disappears.

Perhaps this approach to the problem is too simple for us. It does not suggest enough formality, it does not lend itself to charts, and organizations, and boards, it has little or nothing to do with judges and adjustments, and it is not particularly concerned with committees and trade associations. Perhaps it is only that we do not take the full responsibility for every act as an individual, and we don't wish to emphasize the individual responsibility and character of all difficulty in its inception.

It is so much more convenient to talk about labor than it is to talk about John Smith. We may know John Smith, and anyway he is a particular individual, and we would not care to do him an injustice, but we can say anything about labor because that does not mean a person, it applies to an indefinite mass which in our subconscious reactions has no human individual qualities.

Similarly, we do not care to speak about Robinson, who may be our boss, because we would have to respect his personality even while we disagreed with him, but we can talk about capital and capitalists, and rant all we want to about the system and the men without having any fear of being called to account.

Whatever it may be, we particularly delight in talking about systems of solving difficulties which are individual and human, but we talk little about the individual human necessities. It is not without interest that while there are thousands of books upon Socialism, trade unionism, capitalism and a whole host of industrialisms, the history of literature shows only four books on conscience in the whole literature of which we have any record.

This is called to mind by the fact that Colliers is backing Hoover's system of regional boards suggested in the Second Industrial Conference, and it is getting the opinions of all sorts and conditions of men as to the value of this system. Most of the correspondence published in this respect either endorses or rejects the system with very little attention to the human requirements in the case, and with very little getting down to the brass tacks of the matter—the attitude of the individual worker.

It is refreshing to note a letter from a man in the automotive field which is worth reading for the constructive

character of its suggestions, whatever may be said of the system which is the subject matter of the communication. This letter was written by Alvan MacCauley, president of the Packard Motor Car Co., and we are quoting it at length because of the constructive suggestion it contains:

The proposal in your editorial to "make the settlement before the strike begins" is obviously common sense, and the machinery suggested to insure opportunity for such settlement seems a necessary measure to offset the prejudices and rancors which hinder discussion when controversies reach the strike stage. But it is unfortunate that such rancors should be aroused and, perhaps more often than not, it is unnecessary.

An even better solution of the labor problem, in that it removes the causes of controversies and rancors alike, and a solution very largely in the power of employers, is shown by Mr. Whitney Williams's articles.

These call attention to the fundamental importance of fair and human treatment of the individuals who are the units of the labor problem.

Perhaps the lesson which should be drawn from these articles can be emphasized by the statement of a few of the facts concerning the successful relations which have followed this company's attempts to correct the very conditions which Mr. Williams reports as being galling to workers.

Men will be content and will do good work if they are given fair pay, opportunity for advancement, decent surroundings, treatment which promotes their self-respect, assurance of stability of employment, and work in which they can take pride.

We have felt that all these things were not only possible, but were obligatory upon us as employers. We have attempted no paternalism, have no elaborate system of shop representation, no profit sharing, and we have not found it necessary to resort to collective bargaining.

Our chief difficulties with the policy outlined have been to make sure that it was being carried out through a large force and by hundreds of minor executives. To insure this we have held schools for our shop executives, teaching them a proper attitude toward the men under them, and driving home the fact that their first duty is toward these men even more than toward their superiors. We impress on the foremen that they must look for success and advancement to their men, and that the first point that will be considered in measuring their success is their relations with the men and the amount of their labor turnover.

We have established several rules for the government of our shops which meet points that Mr. Williams found important.

First—We permit no injury to a man's self-respect. We allow no cursing of the men, no "bawling out," not even a reprimand in public. We permit no one below the grade of foreman to administer any kind of a rebuke. We insist that the foreman himself shall receive each new man, put him to work, and see that he is familiar with his duties and his tools. We do not fill the factory with irksome rules. In general, we use the honor system in all our dealings with our men.

Second—We make sure that every man has, and knows that he has, full opportunity for advancement. We try to give wage increases before they are asked for, whenever they are earned. A man is assigned work in accordance with his preference wherever possible.

As men gain in skill they are promoted to more complicated work, instead of being held back because of the very ability they may have developed on the simpler operation.

Third—We do not drive the men. We give them ample time to do work of the kind in which they can take pride. Time study and efficiency methods are used, but in them allowance is made for the superior quality of work we demand, and no man is ever forced, by the standard of production, to turn out poor work in order to make a fair wage. We pay for much of our work on the bonus system, permitting full recognition of individual skill and steadiness, or, in the case of gang work, of the skill of the gang as a whole.

But the standard time on all jobs is so fixed as to permit moderately good men to earn a fair living, without overstrain, while it allows the better workmen to profit considerably.

Fourth—We try to see that each man earns a good wage. If we find that a workman is unable to earn a premium above his hourly rate, after he has become familiar with the job, an investigation is made to see whether he cannot be helped.

Finally, we assure the men against the danger of an increase in the amount of work demanded of them to make their wage by a pledge, rigidly enforced, that after the standard time on a job has been fixed it shall not be changed except to the man's advantage, unless tools or other conditions are changed.

The men recognize this policy and their turnout reflects their individual ability.

Fifth—We do not patronize our men. We have a welfare department which gives them what aid they want in organizing sports or other activities, but the initiative for these things comes from the men themselves. If they ask legal advice or medical attention, we are glad to give it, but we assume no right to supervise or control any activity outside the workshops. We do assume in full the duty of seeing that the shops are clean, well-lighted, well-ventilated, and safe.

In brief, our men are Americans, demanding fair play as a right; self-respecting, intelligent, and honorable. We treat them on this basis. We believe that their contentment, steadiness, and efficiency are the inevitable result of this treatment.

It is impossible to give too much emphasis to the statement that regional boards, national organizations and Whitley Councils will be of no avail in settling the labor problems, unless and until the desires of the individual worker are understood. The basis of every improvement

must be a greater understanding of what is involved in the just and human treatment of the employee, not only in the general way, but in every detail of the operation in the industrial establishment.

The machinery of adjustment which is working in Great Britain represents almost every type which could be conceived of, for permitting full discussion and accumulating all the former methods of agreement.

All these organizations, however, have not eliminated the strike in Great Britain and it is apparent to the observer that their multiplication has confused instead of clarified the matter, while their universal adoption and their relative strength has not assuaged in the least the imperious nature of their demands.

We have maintained in these pages at all times, that the system was unimportant except as it gave expression to the spirit of understanding and the desire for fair play. Systems are necessary in order to provide such means of expression, but we are apt to lean upon them, to complicate them by the introduction of fresh details when they fail and to attempt the impossible tasks of substituting them for understanding between individuals.

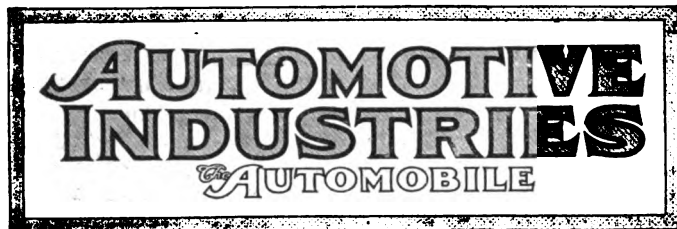
It is not necessary that we should have extensive national systems of industrial conciliation in this country, unless we lack the intelligence in respect of the problem to such a degree that we are unable to secure a fair measure of square dealing between employer and employee in the individual establishment without the pressure of outside opinion.

It is not necessary that we should be obliged to submit the disputes which must arise between small groups of men to the slow, cumbersome and formal processes of such an elaborate method of settlement, if we are ready to take advantage of the present conditions and work in the individual establishment with a decent measure of co-operation.

That agreement which can be brought about by the growth of understanding between men who work on the same job with the same common purpose in production or distribution, is a greater influence for industrial peace than all the formal systems which have been invented so far. It is neither impossible nor extremely difficult to secure this measure of understanding. It requires only a desire for square dealing and human treatment expressed through actions within the factory to bring it about, and the examples which can be found in every industry are sufficient evidence of its possibility.

A little study of the human desires and necessities and a sincere attempt to provide the proper working conditions from this standpoint will give sufficient improvement to establish a large measure of industrial peace. Without that, no particular system has proved its capacity to be of any service.

SEVERAL months ago a company, subsidiary to the Standard Oil Company and called the "Econometique," was formed with a capital of ten million francs. Its headquarters are in Paris, 82, Avenue des Champs Elysees, and its principal activity is to be the distribution of petroleum and gasoline. The company has bought a site of considerable area at Saint Ouen, outside Paris, on which it is proposed to build reservoirs capable of holding several thousand tons of gasoline, kerosene and fuel oil. Pipe lines are to be laid from the quays along the Seine to the reservoirs. The necessary formalities for the construction of this huge oil depot have already been begun, and as soon as they are completed construction will commence.



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Automotive Industries—The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly) July, 1907.

Better Crating

BOXING and crating has been and likely will continue to be a serious question with all exporters, especially automotive exporters. It is generally admitted that the laxity in crating results from ignorance of the conditions that the package will encounter rather than a deliberate intent on the part of the packer to wreck his merchandise en route. During the war the munition and other shippers are reported to have accomplished a very good job in the packing. This was done by specifications provided by the Government for the particular job. The specifications were supplied as a result of investigations by the Forest Products Laboratory. Now the laboratory is quite willing to provide a similar service for any packer who may be willing to come to Madison and study the situation. This is arranged in the way of special classes consisting of 12 men each. An intensive six-day course is provided. Classes will be organized on Jan. 10, March 7 and May 2, 1921. A co-operative fee of \$100 is required, in addition to each student paying his

personal expenses. The fee goes toward the support of the excellent work the laboratory is doing. Applications should be made by the firm that is sending the student, as this is not a plan to equip a man to get a job, but a plan to accomplish a definite service to trade generally.

Incomes and Motor Cars

THE automobile is receiving entirely too much attention from partially informed economists. Automobile economics appears to be comparable to the newspaper business—everybody thinks they know all about it.

This remark is prompted by an article in a recent number of *The Annalist*, a publication deserving of much respect. This particular article looks harmless enough under the title, "One Answer to the Tax Problem Which Might Solve It." Our objection is this—the writer assumed, perhaps unconsciously, that no person with an income below the taxable limit should or can own a motor car. Perhaps he never lived in a small town or has forgotten that a great many persons in more or less rural communities can do what appears to be impossible to the city resident. Has he considered that practically one-half of the automobiles in use to-day are Fords; that many of these were purchased by the savings of years; that many thrifty persons earning comparatively low wages live in small communities where they have their own gardens and space for a garage; that the saving realized on the products of gardens are not within the tax sheet finances, although they in effect materially increase income; that where a person owns his garage and uses a car economically the expense is extremely small; that the ownership of an automobile and its use by a farmer is a part of his exemption? But why continue?

This writer, like so many others, still considers the automobile a luxury. That word applies to a very small percentage of motor vehicles, so small a proportion as to be a negligible factor.

We are in entire agreement with the belief that many persons escape income taxes, but we do not believe that an investigation of the incomes of motor car owners will reveal the tax evaders. We believe that the first step is to simplify the tax return. If ownership of any special article is to be made a test, why not select something that is akin to a luxury, not in any sense a prime necessity. Would it not be better, for instance, to check up on important jewelry purchases, or to require from each taxpayer an exact statement of his expenses for amusements?

Motor Vehicle Safety Aids

ARATHER striking and far-reaching campaign against motor vehicle accidents has been undertaken by the National Safety Council, which has branches in 40 cities of the country. The campaign is based upon the distribution of a series of lessons on safe motor vehicle driving. These lessons are to be placed in the hands of the vehicle owner and driver. The lessons have been prepared by a group

of men who have given their best thought to the problem, and they have considered the rights of the vehicle, the driver and of the pedestrian. The present idea is to obtain the largest possible efficient distribution of these leaflets, and for that reason they are being offered to all branches of the automotive industry for distribution.

This appears to be a step in the right direction—that of lessening the destruction of human life and property. The National Safety Council can be addressed either through a local agency or at 168 Michigan Avenue, Chicago.

The French Economy Contest

CONSIDERABLE interest has been aroused by the rather remarkable results achieved in the recent economy contest at Le Mans, as reported in *AUTOMOTIVE INDUSTRIES* of Nov. 25. The record established by the winner is so much ahead of the usual commercial performances that some people have found it hard to believe the accuracy of the results. But the supervision in the contest was so strict that there seems to have been no possibility of fraud, and, of course, there is no scientific reason why the feat should not be possible.

Two things must be kept in mind in judging the performance. It was not a contest limited to stock cars, and the fuel used by most of the contestants was benzol. Benzol contains more heat units per gallon than gasoline, and, besides, permits of the use of a higher compression, being less given to knocking and pinking. A higher compression is usually accompanied by a higher thermal efficiency, and this, together with the higher heat content should make for quite a reduction in fuel consumption as compared with the use of gasoline. It is therefore impossible to make a direct comparison with consumption records established with gasoline. The claim of a world's record also is not warranted, as there is no world organization looking after economy records.

It is not unlikely that in order to show the best possible economy, some of the cars had their compression volumes reduced to a point where they could not have been successfully operated under full throttle. This gives conditions very favorable to economy at half load or so, which is probably all the power that was required in the test, for not only is the advantage of the high compression gained, but the burning charge is also expanded more than in an engine as normally arranged.

In connection with the question of the most economical running speed, recently discussed in these columns, it is noteworthy that the average speed of the first ten in the French test was about 24 m.p.h.

Economic Research as an Aid to Sound Business

IS the gathering, analysis and application of economic statistics being given the consideration it deserves in the automotive industry? We fear not, else the precious financial situation which to-day con-

fronts many companies in the industry would not have arisen.

The function of statistics was admirably set forth recently in an address by Dr. Joseph E. Pogue before the American Petroleum Institute. It was pointed out that "economic research is growing in importance as a method for investigating operating and economic conditions for purposes of contributing to productivity and accuracy of planning." Such research should be employed far more extensively in the automotive as well as in the oil and other industries than is the case to-day. If it fails to be so used how else is the business executive to be intelligently guided in building for the future? Can he afford to be guided only by gossip in the trade, or by mere "hunches"?

This is the old fashioned method. It can and must be improved. The modern and rational procedure is to apply engineering methods first in securing, then in analyzing available data and finally in applying the deductions made. It is simply applying scientific management to the business end of manufacturing.

Economic research, adequately applied has reduced the insurance business virtually to an exact science. No progressive banking or investment establishment of size and repute is without its statistical and research bureau. Up-to-date advertisers make close and extensive use of research methods in appraising markets. Similar methods must see wider application in the automotive field. They need to be applied to purchasing and production as well as to selling, and should be considered on a broad economic basis, in their relation to other business such as the fuel and steel industries.

Routine or statistical research work can often be carried on advantageously through central bureaus serving an entire industry, but the results require expert analysis and application to individual cases to be most useful. Every manufacturer should consider the matter thoroughly and make certain that his organization is profiting by modern methods in economic research. This is one way in which to build soundly and avoid, at least to some extent, the effects of business depression.

A Christmas Suggestion

IS the "Holiday gift impulse warming your heart toward loved ones and friends"? If so, give 'em an iceless icechest. This thought is suggested in a letter we recently received from the retail sales manager of a concern manufacturing this particular variety of heart-warmers. It's so good we are passing it on to our readers. We are uncertain whether or not the idea originated in Dayton. However, the need for machines of the character noted was evidenced as we understand it, when certain prominent engineers from that region gave vent to their feelings during the development of a cooling machine. An engineer who overheats is much the same as a car that does the same thing. Anyhow, something's apt to be said in either case. Be this as it may, it's a good thing that coolers and warmers are both made in the automotive industry. It provides a larger variety from which to select holiday gifts.

Industry Thinks Upward Trend Near

Greater Confidence Shown on All Sides

Improvement Will Not Be Rapid, However—Potential Purchasing Power Curtailed

(By James C. Dalton)

NEW YORK, Dec. 13—Greater confidence in the future has become apparent in the automotive industry in the past fortnight. This more hopeful feeling pervades all branches of the business, from the parts and accessory makers to the manufacturers of complete vehicles, distributors and dealers. There are signs of renewed life all along the line.

Parts manufacturers are receiving some substantial orders for deliveries covering a considerable period, passenger car manufacturers already have increased their daily schedules slightly or are preparing to do so in the near future, increased interest is being shown in trucks and there has been some stimulation of sales at retail in most sections of the country. The Goodyear Tire & Rubber Co. has called back 9000 former employees preparatory to doubling its present production Jan. 1.

Predictions of better business in the near future with an upward turn in January are based largely upon the belief that the show season, with the attendant advertising campaigns which will cover the entire country, will stimulate interest in automobiles and bring a substantial crop of orders.

Production Peak to Take Time

These expectations undoubtedly will be realized and conditions throughout the industry probably will improve with the beginning of 1921. The improvement will not be rapid, however, and it will be some time before factories are back at the peak of production reached early this year.

Hope that the automobile business will reach a normal basis any more quickly than other industries is idle. As AUTOMOTIVE INDUSTRIES has pointed out repeatedly, the return to normal is dependent solely upon the restoration of a general price level at which the public will buy. This does not mean advocacy of lower prices for motor cars. It means that when the average family budget gets down to what the average man considers fair proportions he will begin thinking about a new motor car. He will not be so much concerned about the price of the car as he will about the price of beefsteak, shoes and a spring suit.

Any one who pretends to predict when that time will come is merely guessing. It will be brought immeasurably nearer when the retailers of household commodities

UPWARD REVISION OF PRODUCTION SCHEDULES MARKS BEGINNING OF NEW BUSINESS ERA

THERE is no lack of concrete evidence that the turn of the tide is near in the automotive industry. Passenger car, truck and parts manufacturers are convinced better business will come with the turn of the year and are making their plans accordingly. Here are a few facts to prove the better feeling:

The Goodyear Tire & Rubber Co. has directed 9000 laid off employees to be ready for duty Jan. 3 and present production will be doubled. The B. F. Goodrich Co. has sent notices to all former employees to report either in person or by mail early in January. The Firestone and Miller companies are keeping in close touch with laid off workers.

The Hupp Motor Car Co. has started a production schedule of 35 a day, six days a week, an increase of 10 a day. The production was 10 a day in October.

The Oakland Motor Car Co. has begun making 75 engines daily and this will be increased, it is asserted, until a daily schedule of 100 automobiles and 150 engines a day is reached next month.

The Ford plant will close for inventory only from Dec. 24 to Jan. 3 instead of closing Dec. 15 as planned.

The General Motors Truck plant at Pontiac has resumed operations after being down a month. About half the workmen have been re-employed on a production schedule calling for 400 vehicles the rest of this month.

The Gale Mfg. Co., Albion, Mich., which supplies castings to many automotive plants, has resumed work after being down for two months.

Operations were resumed Monday in the body factory of the Milburn Wagon Co., Toledo, after being closed since the middle of October. The plant started on an order from General Motors Corporation for automobile bodies representing several million dollars. These are to go to the Oldsmobile plant at Lansing and are for coupe and sedan cars.

dities pass on to the consumers the reductions which already have been made in the wholesale prices of commodities. Regardless of the justice of his contention that he cannot afford to sell at their replacement value the goods he bought at peak prices, it is unquestionably the retailer who is retarding the process of readjustment. The retailer is clinging desperately to the hope that he can unload his high-cost goods during the holiday rush. The break in retail prices probably will come, therefore, soon after Jan. 1.

Condition Not Extraordinary

There is nothing especially extraordinary about the present industrial depression. The conditions which now prevail always have been associated with the collapse at the end of a period of over-expansion and great prosperity. The most remarkable circumstance is that there has been no panic in the generally accepted meaning of the word. Devout thanks for this blessing should be given to the Federal Reserve system. The banks within this system are safe and there will be no bank failures except small institutions in the agricultural districts. Discussing this subject in its December bulletin, the National City Bank says:

"This slump in business conditions has demonstrated again that the great movements which make good times or bad

times are spontaneous and beyond control. They are due to mass action and mass psychology. The business of the country depends upon the purchases and policies of tens of millions of individuals and when they become generally possessed of a spirit of confidence and go ahead with their planning and spending under its influence, we have a period of prosperity."

March Probable Turning Point

Bankers and students of economics generally, in forecasts of the future, fix upon March as the real turning point. They point out that credit conditions will be markedly easier after the first of the year and that this will bring a feeling of greater confidence which will lead gradually to a resumption of business in all lines. As has been said before, however, this will depend upon the establishment of a normal and more or less stable price level.

In thinking of the future and the better business which it undoubtedly will bring, the manufacturer and dealer should not forget that there has been a marked shrinkage in the potential purchasing power of the country. The depreciation in crop value has meant a curtailment of between \$6,000,000,000 and \$8,000,000,000 in the purchasing power of the agricultural population. Makers and sellers of goods cannot go on as

(Continued on page 1243)

Effort to Buy Dodge Plant Likely

New York Interests Long Have Sought It

Death of Both Brothers May Make Efforts Successful, De- troit Bankers Feel

DETROIT, Dec. 12—The death of Horace E. Dodge, in the opinion of Detroit bankers, is certain to result in renewed efforts of New York financial interests to obtain control of the Dodge Bros. Motor Car Co., and with the company passing into the exclusive control of his widow and the widow of John Dodge, it is regarded as highly probable such efforts will be successful.

For the time being, however, the death of Horace will in no way interfere with the conduct of the plant nor the administration of affairs. Horace Dodge has been in bad health since the death of his brother and has given little attention to the details of the business, practically turning over control to F. J. Haynes, vice-president and general manager, and close friend and associate of the Dodge brothers. While it is known Haynes has been in poor health for some time his condition is said not to be such as to compel him to relinquish active management.

It has been reported for some months that the company had felt keenly the loss of A. B. Baker who, during the illness of General Sales Manager Philp, was actual director of sales and merchandising. This, coupled with reports that Dodge Bros. were borrowing \$10,000,000, caused many rumors which were aggravated by the recent announcement of curtailment of production and closing of most of the plant.

President Emory W. Clark of the First and Old Detroit National Bank, and Vice-President C. A. Talbot of the National Bank of Commerce said to-day, however, there was not the slightest concern as to Dodge Bros., and, as a matter of fact, the company was not even being considered in banking calculations. Clark admitted the company had made arrangements for a loan of \$10,000,000, but declared it had never availed itself of the loan or any part of it, finding it unnecessary. Both bankers declared the company in splendid financial condition and not indebted to Detroit banks.

Reports current that the plant might be removed from Detroit were scorned and the financiers declared the suggestion absurd. It was admitted by Clark, however, that the death of Horace in all probability would result in renewed efforts of Eastern capitalists to get control and that success of such negotia-

(Continued on page 1239)



The late Horace E. Dodge

Death of Horace Dodge Shock to Friends; History of Career Reads Like Romance

DETROIT, Dec. 12—The unexpected death of Horace E. Dodge at Palm Beach Friday was a shock even to his close friends. He had been ill for months, but they believed his health was improving and were hopeful that another winter at Palm Beach, where he purchased a winter home, would greatly benefit him. He passed away soon after his arrival in the South, however.

The body of Mr. Dodge arrived in Detroit Monday and was held from 6 to 9 o'clock at the chapel where it was viewed by thousands of sorrowing friends and employees. The body was removed yes-

terday morning to the Dodge home at Grosse Pointe, where the funeral was held to-day.

The honorary pallbearers included not only leaders in the automotive industry but men prominent throughout the country. In the list were Henry Ford, Edsel Ford, William E. Metzgar, C. Harold Wills, H. M. Leland, H. B. Ledyard, John Kelsey, U. S. Senator Newberry, Mayor James Couzens, E. D. Stair, Russell A. Alger, Emory W. Clark, Congressman Doremus and Ossip Gabrilowitch.

Horace Dodge survived his brother,
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Ford to Confine Inventory to Week

Will Strive for Million Schedule —Hupp and Oakland Increase Operations

DETROIT, Dec. 12—In an effort to approach the scheduled million mark for the year's production, the Ford Motor Company will continue in operation until the night of Dec. 24. The plant then will close for inventory and reopen Jan. 3. The original plan was to close Dec. 15. This company now is running better than 4,000 cars and trucks daily on a five-day a week schedule but will fall below the million program about 40,000.

Hupp Motor Car Corp. started this week on a production schedule of thirty-five a day, six days a week, an increase of ten a day. Hupp during October reached a low production record with ten daily, but the schedule jumped to twenty-five November 15. President C. D. Hastings said improved demand prompted increased schedule and said company would ship a thousand cars in December. Plans for New Year to be outlined the last week in December and from reports factory executives say big increase in production, schedule probably be entered upon January 2. Dealers throughout the country, Hastings said, report improved business and brighter outlook.

The General Motors Truck plant at Pontiac has resumed operations after a period of four weeks' idleness. About half the workers are re-employed on a production schedule calling for 400 machines for the balance of this month. According to W. L. Day, manager, normal operation may be expected soon after the new year.

Oakland Starts New Schedule

Oakland Motor Car Co., Pontiac, Mich. Wednesday began making 75 engines daily and as rapidly as skilled labor can be called back plant production will be increased until schedule of 100 automobiles daily and 150 engines is reached, date having been set as Jan. 3. W. H. Mason, assistant manager, said resumption was due to improved demand and outlook for steady increase, said the future be governed entirely by conditions and no set schedule, though present outlook gives assurance consumption will take care of 100 daily.

OLDSMOBILE ADDS FOUR

NEW YORK, Dec. 15—The newest addition to the Oldsmobile line is a four-cylinder model. The existing six and eight cylinder models will be retained. The new model is to be known as the Model 43-A and will be exhibited at the National Shows at New York and Chicago. While retaining some of the characteristics of the older four-cylinder model which was discontinued a couple of years ago, the new model is different

in many respects, especially as regards the dimensions and design of the parts which reflect the trend of engineering progress during the intervening years. The engine is of the overhead valve type with the four cylinders cast in block and the cylinder dimensions are 3 11/16 x 5 1/4 in. The wheelbase is 115 in. and the price of the open models is \$1,445, closed models, \$2,145.

Trade Rally Causes Milburn Resumption

TOLEDO, Dec. 13—An earlier demand for Oldsmobile enclosed cars than was expected by General Motors Corp. has caused that company to ask for immediate delivery of enclosed bodies from the Milburn Wagon Co., with whom the order had been placed for deliveries beginning in January. As a consequence the Milburn body plant began operations to-day for the first time since the middle of October. The order represents several million dollars.

About one-fourth of the usual force of workmen will be started on the order, the Milburn company declared, and more will be added as production progresses and the rate of delivery requires.

Buying Trend Better at Cincinnati Exhibit

CINCINNATI, Dec. 11—That business is soon to return in fair volume was indicated at the convention and equipment exhibit held here this week by the Ohio Automotive Trade Association. The 141 manufacturers who displayed equipment declare that the response from Ohio's retailers was much more encouraging than that obtained at either of the recent equipment exhibits for jobbers in Chicago and St. Louis.

The exhibit was held in a large room adjoining the Music Hall, in which the sessions were held. The meetings were held from Tuesday to Friday and the exhibit all week. Better business and the methods to be employed now and in the future were the theme of all meetings.

Several resolutions were adopted, including disfavor of long parts discounts for national buyers of trucks. One thousand and eighty registered at the convention.

200,000 OUT IN MICHIGAN

KALAMAZOO, MICH., Dec. 13—D. J. Murray, secretary of the Manufacturers' Association, reports that there are over 200,000 unemployed men in Michigan to-day who are in need of immediate work to escape suffering. He has just attended a conference of secretaries at Jackson, Detroit, Grand Rapids, Flint, Muskegon, Pontiac, Saginaw, Battle Creek and Kalamazoo were represented. Employment of labor on public works was recommended. Fifty million dollars was reported available for good roads by Frank F. Rogers, state highway commissioner, who said he favored work to begin at once.

Trade Boom to Come With Liquidations

Detroit Banker Says Manufacturer, Merchant and Farmer Must Meet New Prices

DETROIT, Dec. 11—President Emory W. Clark of First and Old Detroit National Bank addressing wholesale merchants at a dinner at the Board of Commerce declared the automobile industry was not shaky and would come through the readjustment period in good shape. He said none of the companies in Detroit were causing any anxiety.

"It is said the industry is flat," said Clark. "That is true to an extent. In this district it is running at about 30 per cent of its peak production but that is a much better showing than is being made in silks, shoes and other industries." Clark said the banking situation was much improved and said banks are extending more credit than ever before contrary to current belief. He predicted easier money in February, but said it might be March or August before there was a real increase in business.

The banks can not do it all, Clark said and insisted it was necessary for merchandise and labor costs to liquidate. He declared the larger manufacturers and merchants were not subscribing to the plan of the smaller ones in meeting low prices and said it was the former group that was seeking bank accommodations in lieu of turning their stocks into cash. Referring to the cotton growers and wheat farmers in holding their products for higher prices, Clark said he could not see where the "angel" who would pay prices they wanted was coming from.

Liquidation of labor and merchandise would be followed in 1921 by improved business he said, and within three years when the foreign exchange situation has righted itself he predicted a wave of prosperity of a magnitude undreamed of.

JORDAN INCREASES OUTPUT

CLEVELAND, Dec. 13—Jordan Motor Car Co. has started on a 90-day production program. It is an increase in the number of cars per day over the record of the last few months, but is under the program of a year ago.

E. S. Jordan, president of the company, spoke optimistically about future prospects, asserting that so long as men and food and finished products must be moved there will be a demand for cars. He said that he was confident there would be a shortage of cars next spring on account of the slow-down in production after the Ford announcement of price reductions.

LAURINE IN RECEIVERSHIP

NEW YORK, Dec. 14—Application for a receivership for the Lauraine Magnet Corp., Inc., with a factory in Long Island City, has been granted by Federal Judge Knox.

New York Interests Seek Dodge Plant

**Durant Mentioned Among Those
Who May Seek Control of
Big Company**

(Continued from page 1237)

tions would not be unlikely in view of the fact that there is no member of the Dodge families in a position to take up management of the company's affairs. The attitude and advice of Haynes, the bankers said, will have large effect in shaping the attitude of the Dodge families in the event of further efforts to secure control.

Bankers familiar with previous efforts to buy control of the Dodge interests refused to divulge the names of New York financiers who have sought the property. Reports have been heard in many quarters that W. C. Durant, former president of the General Motors Corp., might become interested in such a project, but no authority has been found for this suggestion, and it has been impossible to get in touch with Durant, who is taking a rest in the South.

The Dodge Bros. Motor Car Co. was incorporated in July, 1914, with a capital of \$5,000,000 by John F. and Horace E. Dodge and A. L. McMeans. McMeans retired from the company about a year ago and was succeeded by F. J. Haynes as a director. The surviving directors are Haynes and Howard B. Bloomer, who was elected after the death of John Dodge to represent the family of Mr. Dodge.

The articles of incorporation were amended in November, 1917, when the capital was increased to \$10,000,000. In March of 1917 the Dodge Bros. Motor Co., Ltd., of Canada, was incorporated by the Dodge brothers and Haynes. The Dodges owned practically all the stock of the two companies, their shares being equal. At the time of the original incorporation McMeans held a few shares to meet legal requirements, but these shares now are held by Haynes.

Ericsson Creditors Ask Additional Receiver

BUFFALO, Dec. 10—A committee representing the merchandise creditors of the Ericsson Mfg. Co. met here to-day to decide what action can be taken to save the corporation from bankruptcy. The plant now is being operated by receivers and an involuntary bankruptcy petition has been filed against it by three creditors with small claims. The receivers have declined to combat the allegations of bankruptcy, although the majority of the creditors are convinced the company is solvent and could be saved if efforts were directed along the right lines.

The committee adopted a resolution to petition Federal Judge Hazel for the appointment of an additional receiver to represent the merchandise creditors and

INDUSTRY REGRETS PASSING OF DODGE

DETROIT, Dec. 14—Universal regret is expressed in Detroit at the death of Horace Dodge. In speaking of it to-day, Roy D. Chapin, president of the Hudson Motor Car Co., said:

"Horace Dodge and his brother formed one of the greatest constructive forces the industry ever has had. High ideals in manufacturing gave to Horace Dodge not only the respect of his fellow men but the unbounded good will of his workmen. The Dodge brothers had a fine reputation as manufacturers, and the splendid teamwork within their organization demonstrated the good that can be accomplished by two men working in such close harmony. Horace Dodge was a man of broad interests and an active supporter of many things outside his great organization. His love of music and art typified the real character of the man."

This tribute to Mr. Dodge was paid by Alvan Macauley, president of the Packard Motor Car Co.:

"The death of Horace Dodge is a distinct loss not only to the automotive industry but to the entire world. I never was intimate with him personally but his influence in the industry was impressive and the business of the entire nation, particularly Detroit, has suffered in his death a loss which cannot easily be overestimated."

also decided to apply to the court for instructions to petition against bankruptcy proceedings. If it becomes necessary, a jury trial will be asked.

It was the sentiment of the members of the committee that if the business is developed during the next few months until normal conditions are restored, the creditors will receive much larger payments than if bankruptcy were permitted.

Grant Trade Grows; Refinancing Completed

CLEVELAND, Dec. 13—Stockholders of the Grant Motor Car Corp. have taken up an issue of 8 per cent notes that mature Nov. 21, 1921, according to George C. Hubbs, general manager of the corporation. The funds thus derived will be used to tide the company over.

Hubbs, after the meeting, said his company sold more cars this month than in the last three months and that he was confident business would gradually improve. He said that the whole situation had been aggravated by a willingness on the part of men in the industry to talk about difficulties of the present condition and by a neglect to put forth increased activity that is needed.

White Not to Cut Rate of Dividend

**Statement by Vice-President Is
Repudiated—Will Not Seek
New Finances**

CLEVELAND, Dec. 15—Reports that the White Motor Co. would reduce working hours at its plant 10 per cent on Jan. 1, and that the annual dividend rate of \$4 per share would be reduced for the first quarter of next year, as contained in a statement by E. W. Hulet, vice-president in charge of production, have been formally repudiated by Windsor T. White, president of the company.

In a letter to stockholders, White declares that the statement of Hulet was made without consultation and without the knowledge of other officers of the company or the executive committee. No such reductions in dividends are contemplated, he declared, but on the contrary, that it is the great desire and expectation of the company to continue the uninterrupted regularity of its dividends on its present basis.

Earnings in the past are quite sufficient, White said, to make this policy permissible during the ensuing year. Dividends have been declared at a low rate, considering earnings of the company, he asserted, with a view to a policy of regularity. The board hoped, he said, that its policy in this respect can be maintained.

The company is in no immediate need of financial assistance, he said, its position being entirely comfortable. Existence of \$10,000,000 in stock, authorized early in the year but as yet unissued, he said, had given rise to the report that the company was in the market for financial purposes. There is no immediate need for the sale of these securities, he maintained.

No direct reference was made by White to that part of the Hulet statement in which Hulet said that working hours for employees would be reduced and that salaries for salaried workers and executives would be cut 10 and 15 per cent. He did say, however, that the policy of the company in maintaining dividends at a regular rate, even when earnings might have justified increases, permitted the company to maintain regularity of output, regularity of employment and regularity of compensation for labor.

Policy Protects All Interests

It also permitted, he said, high quality of production at low cost for the benefit of customers. Every effort will be made by the board, he declared, for the protection and development of the rights of each class of those to whom it is responsible.

It had been reported here that the company would issue the \$10,000,000 in stock to stockholders at par, the balance, if any, to be offered publicly, so that the company might continue full production of trucks during the winter.

Goodyear Changes Treasury Officials

Reorganization Is Made in Accordance With Understanding With Financial Advisors

AKRON, Dec. 9—Under the permanent financing program of the Goodyear Tire & Rubber Co., now being negotiated with a group of Eastern banking interests, and to be definitely announced at the adjourned meeting of stockholders in Akron, Dec. 24, the treasury department of the company has been reorganized, it was officially announced to-day.

W. E. Palmer, secretary and treasurer of the Goodyear Co. and one of the oldest officials, retired as treasurer as of Dec. 6, but will continue as secretary. In announcing this change, Vice-President G. N. Stadlemem to-day issued the following statement:

"In accordance with the understanding had with the financial group undertaking our refinancing, the duties of the treasury department have been assumed by members of the staff of Price, Waterhouse & Co., who are acting as accountants in behalf of the financial group. Accordingly W. E. Palmer has resigned as treasurer, but retains the office of secretary. N. J. Blackburn, assistant treasurer, and H. N. McCloskey, second assistant treasurer, also resign, all resignations taking effect as of Dec. 6, the date of the annual meeting of the company. Both Blackburn and McCloskey have been assigned other duties with the company."

Under the reorganization plan, T. Jackson of New York succeeds Palmer as treasurer, with C. L. Weberg as assistant treasurer, and P. H. Hart, as second assistant. All are representatives of Price, Waterhouse & Co., the accountants who are acting for the banking syndicate which will handle the refinancing of the company.

To Reduce Capital Stock

In an official notice issued to stockholders, announcing an adjourned meeting on Dec. 24, officials and directors of the Goodyear company announce that stockholders will be asked to ratify the proposed reduction of the amount of capital stock of the corporation from \$100,000,000, consisting of 1,000,000 shares of \$100 par value each, to \$50,000,000 consisting of 1,000,000 shares of the par value of \$50 each.

Stockholders will also be asked to ratify the proposed reorganization of the corporation in pursuance with State laws authorizing the "reorganization of corporations with common stock without par value," so as to permit the issuance of shares without par value. Under the new plan the reorganized corporation will have an authorized capitalization of \$100,000,000, seven per cent preferred stock with the rights and privileges of the outstanding preferred stock, and not

to exceed 1,500,000 shares of common stock without par value.

The terms upon which the outstanding preferred stock will be exchanged for the new shares will be one share of the outstanding preferred stock for one share of the new preferred stock, and one share of the outstanding common stock with par value for one share of common stock without par value. Stockholders also will be asked to authorize the issuance of not to exceed \$50,000,000 in 8 per cent bonds or notes, and the authorization of a mortgage or deed of trust to secure the payment of these bonds or notes, the mortgage to be delivered to the trustees.

Stock Conversion Necessary

It is announced by the company that any plan of refinancing necessarily will involve converting the common stock with par value into common stock with no par value. Each holder of the present common stock will receive the same number of shares of no par value stock, to preserve the common stockholders' proportionate interest in the company.

Definite announcement of the permanent financing program to replace the temporary loan of \$28,000,000 recently negotiated and payable February 15, 1921, will be made at the meeting. Officials of the company say it will probably be necessary to provide securities in the form of bonds running for a period of not to exceed 25 years and to have such securities secured by a mortgage on the property of the company.

Charles B. Ames Dies After Brief Illness

NEW YORK, Dec. 15—Charles Bernice Ames, who died Dec. 10, after a brief illness, was connected with the automobile publishing business for more than twenty years. In this field he was first associated with *The Horseless Age*, as advertising manager, having been persuaded to take up the work by his former college mate, E. P. Ingersoll, then publisher of that magazine. Mr. Ames had previously been engaged in teaching, first at Rutgers College and later at the DeWitt Clinton High School.

After several years with *The Horseless Age*, Mr. Ames became manager of *Motor* a month or two after that publication first appeared. Later he also was advertising manager of *Motor Boating*. He remained with *Motor* and *Motor Boating* until 1909, when he bought a part ownership in *The Horseless Age*, Mr. Ingersoll having sold out and retired from the company. In 1915, with another change of ownership of *The Horseless Age*, Mr. Ames returned to *Motor* as publisher of that magazine, resigning about three years later to become vice-president of Motor Life Publishing Co.

Mr. Ames was born in Fort Edward, N. Y., in 1865. He graduated from Williams College with the class of '85. He ranked high in scholarly attainments and was rewarded with membership in Phi Beta Kappa. He leaves a wife and married daughter.

Roads Have Share in Business Slump

Louisiana Official Believes Improvement Will Bring Firmer Basis—Outline Plans

NEW ORLEANS, Dec. 13—Among the most important matters to be taken up by the convention which has been authorized to rewrite the Louisiana state constitution next February, will be the construction and maintenance of a state-wide good-roads system, at a cost ranging from \$28,000,000, as provided in one plan, to \$35,000,000, as provided in another. Automobile manufacturers, distributors and dealers, motor leagues and other organizations of motorists have been invited to take part in the discussions at this convention.

Governor John M. Parker issued this invitation to the men of the automotive industry at a recent meeting of Ford dealers here. The Motor League of Louisiana, the New Orleans Automobile Dealers' Association, the Jefferson Highway Association, and other organizations are now at work on plans to be presented to the constitutional convention.

The only question in the entire matter which will cause any argument before the convention will be the method of raising the money, one plan being to assess a general property tax, extending over seven years, and the other a twenty-year bond issue. Proponents of each of these financing plans are a unit on the fact that the state-wide road system must be built, and if either faction on the financing shows any gain of strength over the other both have said they will unite to put the stronger project through.

One of the most active of the motorists' organizations in this work is the recently re-organized Jackson Highway Association, of which Col. T. C. Campbell is vice-president for Louisiana. The local branch of this association stands for the elimination of the parish roads, which form a patchwork of all but useless highways all over the state, and Col. Campbell is of the opinion that the work should be done by bond issue, and thoroughly supervised by engineers of the Federal Government. He said:

Interstate Roads Important

"If we had a state-wide system of good roads to-day, connecting with interstate roads at our state boundaries, business conditions in general would be better, the automobile industry throughout Louisiana would be on a firmer basis.

"Contracts for this road building should be divided into five or ten mile strips, and each strip allotted to a separate contractor, both to speed the work to completion and to establish a rivalry between the contractors which would work toward better construction of the whole. This plan, also, would make inspection by the Government engineers easier, and repair of defects, or replacement of bad work—if any were found—much more rapid."

Trade Commission Recommends Suits

Names Five Implement Associations in Report on Price Fixing to Congress

WASHINGTON, Dec. 15—Evidence purporting to show that there has been a combination of 200 manufacturers of farm implements during 1916-18, inclusive, to fix prices "higher than the increased cost of manufacture and materials," and that dealers had made local agreements supporting the practice, all of which is alleged to be in restraint of trade, has been presented to Congress by the Federal Trade Commission, and is now under consideration.

Judicial proceedings against five organizations of farm implement manufacturers and dealers, and the reopening of the Government's anti-trust prosecution of the International Harvester Co., are recommended in the report, which is in response to a Senate resolution ordering an inquiry.

Those against whom court proceedings were recommended were the National Implement & Vehicle Association, the Southern Association of Wagon Manufacturers, the Carriage Builders' National Association, all organizations of manufacturers; and the National Federation of Implement & Vehicle Dealers, and the Eastern Federation of Farm Implement Dealers, retailers' associations. The International Harvester Co. did not enter the activities relative to price fixing on harvester machinery, the report declares, but did so as to other implements produced.

Alleged correspondence between manufacturers, which was held to show price fixing agreements, was made public by the Federal Commission as part of its special report. This correspondence, as given out, was signed apparently by high officials of companies in the associations and contained passages in which some of the transactions between firms were referred to as illegal.

Increased Income 152 Per Cent

The commission charged that the implement makers, partly as a result of the alleged combination, had increased their net income for 1918, 152 per cent above the 1914 mark and profits on capital from 9 per cent to 17.1 per cent, while dealers' prices had increased 62 per cent. Owing to the increased prices of farm products during the period under consideration, the commission said, the prices charged among the implement trade did not reduce farm profits materially. Opinion was, however, that they might do so during a period of falling prices.

Assistance was rendered the manufacturers and dealers in their maintenance of prices after the armistice by implement trade papers and the Agricultural Publishers Association, the report said, who were led into this position under

NORTHWAY GIVES BONUS

BOSTON, Dec. 11—Employees of the Northway Motors Corp. at Natick received a stock bonus of approximately \$6,000. The distribution was of the common stock, ranging from one to five shares per employee.

It was provided, however, by the company in this distribution that if for any reason an employee does not wish to keep his stock, the company will take it from him and allow him \$15 for each share of bonus stock.

the cover of bringing about uniform cost accounting, uniform terms of sales and standardization of products.

McCORMICK DENIES COLLUSION

CHICAGO, Dec. 15—Previous denials of collusion with competitors regarding prices were reiterated by Cyrus H. McCormick, chairman of the International Harvester Co.'s board, in reply to the Federal Trade Commission's report to Congress. "We contend," he said, "that the commission has acted without warrant in seeking to revive the Government's suit. This report presents no fact on this subject except its distinct finding that the company's percentage of trade in lines which the commission accuses it of dominating continues steadily to decrease.

"As the record shows, and as we have previously stated, the Federal Court's decree gave this company a definite period in which to make certain changes in its business. That period has not expired."

King Motor Assets Sold for Half-Million

DETROIT, Dec. 13—Assets of the King Motor Car Co. were sold to-day to Charles A. F. Finnegan of Buffalo, for \$500,000, of which \$100,000 was in cash. The plant will be operated with A. Weber of the Finnegan organization in charge and D. D. Calvert as factory manager in active control. The plant has been moved from the Jefferson avenue location to the plant of the Crucible Steel Co. on Conant avenue. Calvert says the new owner has not formulated any plans for next year in so far as production schedules are concerned. No cars have been built this month, but work was finished in November on thirty cars which were incomplete at the time the receivership bill was filed.

FREDERIC IVER JOHNSON DIES

FITCHBURG, MASS., Dec. 13—Frederic Iver Johnson, son of the founder of Iver Johnson's Arms & Cycle Works of this city and who succeeded his father as president of that company, died at his home here of heart trouble. He had recently been interested in pneumatic tires, having left the Iver Johnson concern some years ago.

Motorcycles Stir British Enthusiasm

Buying Hesitancy Less Than at Automobile Exhibit—Four American Cars Shown

LONDON, Dec. 1 (*Special Correspondence*)—The attendance and the general atmosphere on the opening day of the sixth International Motorcycle Show at Olympia, which opened on Nov. 29th, were both far more encouraging to exhibitors than was the case on the first day of the Automobile Show which closed a fortnight earlier, and the number of visitors with buying intent has since increased day by day. There was not the same hesitancy on the part of buyers, and although the number of orders actually placed by private individuals was not comparable with the first few days of last year's show, prospects for 1921 have so far been distinctly encouraging to the majority of exhibitors.

Three nationalities are represented in the exhibits of complete machines, American, Belgian and British. The former consist of Harley-Davidson, Henderson, Indian and Reading-Standard, each of whom has a good display, the first three on excellent sites. Belgium has a solitary representative in F. N., the remainder of the 98 stands where solo machines and sidecar outfits are shown being occupied by British products. The solo machines total 370 of all nationalities and the sidecar outfits 170.

On four stands motor attachments for pedal cycles are shown; motor scooters on five; sidecar carriers for parcel delivery on seven, and three-wheeled light cars or runabouts on nine, the latter machines being classified as motorcycles for taxation and exhibition purposes, though having little or no resemblance to them except, in most cases, the air-cooled V twin engines.

From an engineering standpoint the show is disappointing, for apart from detail improvements, the majority of the machines do not differ remarkably from those of last year. The main feature of the show is the increasing popularity of lightweight machines (under 200 lb. and with two-stroke engines of 2¼-2½ h.p.); there are approximately 50 firms making these, prices ranging from \$230 to \$400.

Scooters Biggest Development

But despite lack of real progress in the normal types, there are examples of motor scooters which show development that will probably lead to a new type of machine; this will appeal to an entirely new and very big market, the latter consisting of men who require what may be termed a miniature car on two wheels, resembling the present day motorcycle in light weight, air-cooled single or twin cylinder engine, handle bar steering and small storage space, but having pronounced advantages in respect of comfort, cleanliness and protection for rider, engine and transmission.

New York Receivers for Commonwealth

New York State Assets Protected in Latest Legal Proceeding in Controversy

NEW YORK, Dec. 12—Justice Co-halan of the Supreme Court has appointed Lawrence M. D. McGuire and James E. Landy temporary receivers of the assets in this city of the Commonwealth Finance Corp., a South Dakota company, to protect the New York State assets. The receivers are required to give bond of \$100,000. This is the latest of the legal steps which have shaken the company for several months in a struggle for control.

First in the controversy came the ousting of Sargent & Co. from the management by the purchase by Henry D. Tudor and Ormsby McHarg of 15,500 shares of stock for \$218,000. This was in January last. Six months later the Tudor faction removed McHarg as secretary-treasurer and practically excluded him from the offices, even as a director. Immediately afterwards McHarg made charges of mismanagement, fraud, misappropriation of funds and falsification of books against the Tudor management and Tudor retaliated with similar charges against McHarg.

About this time a stockholders' committee, with headquarters in Minneapolis, was organized with James E. Carlson as secretary. This committee refused to join with McHarg, alleging that his hands were not clean, but began proceedings in the South Dakota courts against Tudor. It asked that the directors be removed, that "the illegal bonus stock" be cancelled, that the directors pay back into the treasury or make good "losses and misappropriations" to the amount of over \$1,000,000, that an election of directors be held at which "only those may vote who have paid for their stock," and that in the meantime a receiver be appointed to carry on the business until a new board could be elected.

Court Enjoins Directors

The evidence was heard in the Circuit Court at Huron, S. D., and the judge entered a decree against Tudor and his associates which said that they had "been guilty of gross mismanagement, malfeasance and misappropriation of funds," and that under their control the assets were "in great and imminent danger of dissipation and loss." The decree granted an injunction restraining Tudor and his associate directors from directing the affairs of the company. Coe I. Crawford of Huron and Z. S. Freeman of this city were appointed receivers under these proceedings.

Tudor alleges that the Minneapolis committee, which is seeking the support of stockholders in its work, was organized to help McHarg get "revenge" and that its chief counsel, a Minneapolis lawyer named Selover, is a legal associate

HELDT TO REVIEW CAR DEVELOPMENT

NEW YORK, Dec. 12—P.M. Heldt, engineering editor of AUTOMOTIVE INDUSTRIES, has accepted an invitation from the publishers of the Encyclopedia Britannica to prepare the article on motor car development during the last ten years, which will be used in three supplemental volumes to be brought out as soon as possible. Only one previous article on automobiles has been printed in the encyclopedia and that was prepared by Edward Shrapnel Smith, editor of Commercial Motor, London. Heldt's article will supplement this and an American was chosen to write it because of the unequalled development of the industry in this country.

of McHarg. He also asserts that several members of the committee were not stockholders of the corporation when the committee was formed. He has sent out circulars to stockholders asking their support and promising payment of a dividend when the controversy is adjusted. The Minneapolis committee is seeking to prevent payment of this dividend on the ground that it would have to be paid out of capital.

The main offices of the company are in this city, as are most of its assets, and the receivers appointed by Justice Cohalan will be in charge until some satisfactory adjustment is made.

Piccard, Pictet Fails; \$5,000,000 Involved

NEW YORK, Dec. 11—A dispatch from Geneva, Switzerland, announces the failure there, for \$5,000,000 of Piccard, Pictet & Cie. one of the largest Swiss engineering firms. The firm built the Palace at Geneva in which the present meeting of the League of Nations is being held. It also built the first turbines installed at Niagara, and during the war manufactured munitions for the Allies.

For some years it has also been engaged in the manufacture of an automobile known as the Pic-Pic, a machine with a single sleeve valve engine, built under the Burt-McCullun patents. The Pic-Pic car at present being imported into this country is of French manufacture, produced under license from the Swiss firm by the Gnome and Le Rhone Co.

HIBBS RECEIVER NAMED

FORT WORTH, TEX., Dec. 12—Hibbs Rubber Co., Inc., went into the hands of a receiver, Dec. 10, upon the application of a machine company, which alleges an indebtedness of \$509 to itself and \$66,000 to other concerns. C. C. Gumm was named receiver by District Judge Roy. He has taken charge of the plant here, which manufactures automobile tires.

Investigation Asked of Boston Companies

Heavy Losses by Commercial and Mutual Arouse Stockholders to Action

BOSTON, Dec. 11—As an aftermath of the blowing up of the Massachusetts Motors Co. that had the agency of a number of cars in New England the report of the trustees of the Commercial Finance Corp. and the Mutual Finance Corp. shows that it cost them hundreds of thousands of dollars through their dealings with the Motors company.

As a result of the report one of the stockholders has written to District Attorney Pelletier enclosing a copy of it, asking if he would investigate the possibility of criminal negligence in handling the finances, and a letter also has been sent to the trustees asking them what they propose to do.

The report from the trustees sent to the stockholders says in part:

"The paid-in capital of the Mutual Finance Corporation has depreciated about 34 per cent, and that of the Commercial Finance Corporation about 41 per cent.

"The following tabulation shows the approximate financial situation of the Commercial Finance Corporation as of Dec. 1:

Capital paid in cash Dec. 1, 1920	\$2,077,964.31
Loans listed as of	
doubtful value.....	\$1,213,999.16
Deduct charged off as	
bad	547,271.47
	547,271.47
Balance.....	\$666,727.69
Estimated realizable.	363,459.46
Doubtful or bad as	
of Dec. 1, 1920....	\$303,268.23
	303,268.23
Possible impairment.....	\$850,539.70

The committee says, concerning the Commercial Finance Corporation's affairs:

"The amount charged off as 'bad' includes the indebtedness of the Massachusetts Motors, Inc., amounting to \$493,792.51. That company is now in bankruptcy, and the amount charged off is after allowance for the present value of the assets in bankruptcy. Your committee has collected to Dec. 1 \$488,981.85; have paid indebtedness to the Mutual Finance Corporation and others for loans of \$257,231, and has invested \$178,110 in United States Victory Bonds and Certificates of Indebtedness.

"The following tabulation shows the approximate financial situation as of Dec. 1:

Capital paid in cash Dec. 1, 1920	\$2,096,846.27
Loans listed as of	
doubtful value.....	\$1,138,390.55
Deduct charged off as	
bad	154,692.90
	154,692.90
Balance.....	\$983,697.65
Estimated realizable.	412,397.49
Doubtful or bad as	
of Dec. 1, 1920....	\$571,300.16
	571,300.16
Possible impairment.....	\$725,993.06

Post Office Praises Trucks and Planes

Would Advance Use of Both in Carrying Mails—Urges Better Highways

WASHINGTON, Dec. 13—Postmaster General Burleson's annual report to Congress emphasizes the essentiality of the motor truck in the economical and efficient operation of the Postal Service. He has advocated the complete motorization of the post office department's delivery equipment, universal license fees, load restrictions on highways and uniform traffic regulations.

Burleson believes that the success attending the handling of parcel post and other mail matter in such large volumes is the direct result of a carefully developed motor transportation system. More than fifty per cent of the aggregate number of vehicles employed in the Postal Service are motor propelled.

The Government-owned motor-vehicle service has been gradually extended until on July 1, 1920, it was in operation in 163 cities. In 50 of these six or more trucks are in use, while in the remainder of the cities less than six trucks are engaged in the transportation of mail. The service requires 2,606 trucks, ranging in size from three-eighths to 5-ton capacity. The number of supervisory officers, clerks, mechanics, chauffeurs, and garage men necessary in the operation and upkeep of these trucks total 3,880. Government-owned service is being extended as rapidly as motor-truck equipment becomes available, and by January 1, 1921, it will have been established in 10 additional cities.

Takes Over Truck Body Plant

During the past year the cost of standard screen bodies secured under contract for use on mail trucks has increased approximately 100 per cent, and considerable difficulty has been experienced in obtaining deliveries within a reasonable time after an award was made. With a view to reducing construction cost and also with the object of securing an adequate supply of bodies, the department has leased the plant of a failing contractor for body construction and is manufacturing its own mail-truck bodies. It is believed that a more durable body can be produced in the plant operated under the supervision of the department than is the case where bodies are secured under contract and the cost of construction will be less than that now being paid for body equipment obtained under contract.

"The interruptions and failures in the Rural and Star Route Services, which during the periods of bad weather continue to occur with too great frequency," stated Burleson, "are evidence that the successful operation of these services is dependent upon the character of the highways on which they are performed, and therefore the department is deeply concerned in the improvement of the

highways, not only because of the economy of the operation, but because it would permit the more rapid extension of service to all possible rural patrons and insure to them the delivery and collection of their mail on expeditious, dependable, and uninterrupted schedules. Through such improvement of the highways and their use in the transportation of foodstuffs, it would be possible to convey an average of not less than 1800 lb. a day per route, as compared with 24 lb. at present conveyed."

Hope for Scientific Highways

It is only through the efficient use of improved highways that the Postal Service may perform adequate service to the people. In view of the large continued Federal appropriations to aid the States in the improvement of their highways and the constantly increasing appropriations for this purpose which are being made by the States, there is hope that eventually the highways of the country will be efficiently and scientifically improved and used. Furthermore, uniform traffic regulations, universal license fees, and load restrictions should be required wherever Federal aid is provided for construction or improvement.

The Postmaster General pointed out the necessity for encouraging researches into aviation and Government assistance in the development of commercial air lines. He stated that the utilization of discarded war training planes would cut the operating cost of the air mail service about forty per cent. These salvaged war planes that are now being prepared for the mail service will carry 6 lb. of mail with 240 horsepower motor and have a cruising radius of five hours.

It has cost the Post Office Department \$553,156.10 to operate the Air Mail Service, including interest on investment, the writing off of losses for planes and equipment damaged beyond repair, and including every conceivable expenditure in connection with the flying of planes. It is a notable fact that this expenditure advanced the delivery of 23,463,120 letters, sixteen to twenty-four hours, at a great saving over train service. The Department spent \$646,143.70 for the adaptation of surplus military planes to air mail work and the purchase under bids of needed modern equipment.

Would Encourage Air Mails

The Postmaster General has recommended an amendment to the law which would permit the making of contracts for carrying mail by airplane, even at increased cost over train service, considering the commercial benefits to be derived from the greater expedition of mail. He also suggested more liberal contract service and extension of the system of Government routes as follows: Boston to Detroit, via Buffalo; Chicago to Los Angeles, via Kansas City; St. Paul—Minneapolis to Seattle; and St. Louis to New Orleans, via Memphis.

The Navy Department has agreed to deliver to the Post Office Department 15 Caproni planes mounted with three engines, capable of carrying a ton and a quarter of mail.

Industry Believes Upward Trend Near

Adjustment of Low Crop Prices and High Wages Determining Factor

(Continued from page 1236)

though this had not occurred. The price of what the farmer wants to buy must come down to the level of what he has to sell before a balance can be restored. Until that time comes the farmer will buy only what he has to have and he will be in no mood to bandy words with salesmen. It would seem logical that this should apply with especial emphasis to automobiles.

When the agricultural population is mentioned it means the growers of grain, cotton, sugar, rice, wool, hogs and cattle and scores of other commodities. The ramifications of this industry affect probably half the population of the United States and the purchasing power of more than 50,000,000 people will be correspondingly cut.

Another important factor in the situation which must be readjusted before equilibrium can be restored is the wage question. High wages have a large bearing on costs of manufacture and the wage earner must accept the inevitable reduction before the cost of living can go back to anything like the pre-war level. The laborer is unwilling, naturally enough, to accept a cut in wages before he can be shown that there has been a corresponding drop in the cost of the goods he has to buy.

Notwithstanding all the unfavorable elements, however, the United States should congratulate itself upon the fact that it is coming through the post-war period with so little of disaster. The dislocation of industry has been much less severe than might have been expected and it is preliminary to a long period of prosperity. This prosperity will be less spectacular than that which came with the war and immediately after the armistice, but it will be built upon a solid foundation and it will last—unless the world is shaken by another great war.

The automotive industry will weather the storm with flying colors and it will have its full share of the harvest which is to come. But to reap its rewards it must be conducted along sane and conservative lines and the men engaged in it must work hard if they are to prosper. All they can do now is to strike hard for all the business available, for there is more of that business than appears on the surface, and hang on to await the dawn of a brighter day.

PERKS CANTON RECEIVER

CANTON, OHIO, Dec. 13—G. W. Perks of Akron has been appointed receiver for the Canton Automobile Parts Mfg. Co. Two suits were brought for a receivership, one by a creditor and the other by three directors.

Horace Dodge Death Is Shock to Friends

Early Mechanical Training Fitted
Him for Industrial Eminence
—Began with Ford

(Continued from page 1237)

John, by less than eleven months. The latter died at the Ritz Carlton Hotel in New York, January 14, after a short illness from pneumonia following influenza. The two brothers had gone to New York for the automobile show and became ill almost at the same time. Horace was two years younger than John.

The success of the Dodge brothers in the automobile industry had been spectacular. In less than twenty years they accumulated a fortune of many millions.

When the twentieth century dawned they were manufacturing automobile parts in a small plant, employing only eleven men. Soon after they began work they made an arrangement with Henry Ford whereby they were to take a \$5,000 interest in the Ford automobile plant. They sold that \$5,000 interest to Henry Ford in July, 1919, for \$27,000,000.

Horace E. Dodge was born at Niles, Mich., May 17, 1868, and with his brother, John, spent his early life at a bench in his father's machine shop where they learned their trade.

The family later moved to Port Huron where the father started a machine shop, and it was here the brothers gained first knowledge of internal combustion engines, the father specializing in marine engine work. The brothers came to Detroit in 1886 and went to work for the Murphy Engine Co. at \$18 a week, remaining there until 1894, when they went to Windsor, Ont., and became machinists for the Dominion Typograph Co. Their ability attracted the attention of Fred S. Evans, a Detroit manufacturer, and when the brothers invented the first ball bearing bicycle Evans joined them in the Evans & Dodge Bicycle Co., leasing the Dominion plant and operating it as their first business venture.

First Interest Brought \$10,000

In 1899 the Dodges sold their interests in the Canadian plant for a sum between \$5,000 and \$10,000. They removed the plant machinery to Detroit where they started a machine shop in 1901, employing twelve men. A few years of hard struggling and near-failure were followed by a period of prosperity. They secured large quarters and enlarged their facilities, continuing the business in Hastings Street until 1910 when the present Dodge Bros. plant was started. It was in the Hastings Street plant the brothers began their careers as automobile builders, their first contract being for 3000 sets of transmissions for the original Olds runabout.

When Henry Ford organized the Ford Motor Co. in 1902 he persuaded the

Dodge brothers to engage in the manufacture of engines, transmissions and steering gear, and as the Ford business increased they were compelled to add to the Hastings Street plant until at the time they left it in 1910 it was the best equipped machine shop in Detroit.

Worked on Ford Engine

While perfecting his engine, Ford met with many difficulties and frequently consulted the Dodge brothers, who are credited with much of the success of the Ford engine. When he organized his company he persuaded the brothers to take an interest, and they agreed to buy \$5,000 worth of stock, to be paid for out of their profits on the manufacture of 650 Ford chassis. The engine was perfected and manufacture of Ford cars was started. A short time later the Dodge brothers bought the Ford stock owned by A. Y. Malcomson for \$175,000, Malcomson having paid \$25,000 for it.

In 1908, when Ford capital was increased to \$2,000,000, the Dodge brothers each received 1000 shares of \$100 par value. In 1917, when the Dodges en-joined Ford from turning profits back into the business, testimony showed their holdings to be worth \$36,000,000, beside which they had received \$5,500,000 in dividends. When Ford purchased the minority interests in his company in 1920 the Dodge brothers received \$27,000,000 for their 2000 shares and their share of the 1916 profits.

Disagreement with Ford arose in 1907. With hard times approaching and the Dodges' plant operating almost exclusively on Ford products, they feared inability to weather the storm in the event the Ford company met with difficulties and sought to have Ford absorb their plant. The latter delayed the issue a whole year and friction increased until what they declared to be Ford's efforts to pare the profits of Dodge brothers resulted in their determination to enter the automobile field. They notified the Ford company that it must make its own engines, transmissions and differentials, and the brothers began active preparation for entering the automobile field, starting construction in 1910 on the \$1,000,000 plant now occupied, completion of which required more than two years. Production of Dodge cars was begun in 1914, the brothers that year severing active connection with the Ford company.

Fourth Place in 1917

Dodge Bros.' product rapidly took a leading place in the automobile field and from eighth place in point of production in 1915 the plant rose to fourth place in 1917, and now is probably second only to Ford, the present normal production being about 625 cars a day. The phenomenal growth of the company is shown in the fact that the plant now represents an investment of \$20,000,000, the buildings covering 75 acres.

During the war Dodge Bros. built, in a period of four months, a munitions plant, pronounced the finest in the country, at a cost of \$10,000,000, covering 11 acres, and employing 8000 men.

Army Truck Sale Threatens Market

House Sub-Committee Considers
Plan to Sell Vehicles Now
in Camps

WASHINGTON, Dec. 15—Between 30,000 and 40,000 motor trucks owned by the War Department will be dumped on the American market within the next year if Representative Anthony of Kansas is able to put over a project he has devised to promote economy. Anthony is chairman of the sub-committee of the House committee on appropriations which is considering how much money will be required to meet the military needs of the Government the coming year.

It is the contention of Anthony that the Army has vastly more trucks than it needs and that the public can absorb them without difficulty. He does not seem to be concerned about the future of the truck industry, which is now virtually flat because of the depression which has accompanied post-war readjustment. He said he "guessed" the "market can stand it."

Most of the trucks the army has are of more than two tons capacity and they are stored chiefly in Eastern camps. Many of them never have been used.

The appropriations committee is determined to slice about \$400,000,000 off the War Department budget. Anthony and some of his associates believe considerable revenue can be derived from the sale of these trucks. If a clause to this effect is not inserted in the appropriations they will seek special legislation.

Asked to-day why the major part of these trucks could not be taken over by the Post Office Department and the Bureau of Public Roads, Anthony asserted these branches of the Government service already had more motor vehicles than they could use. As a matter of fact, however, Postmaster General Burleson has recommended that the entire department be motorized, and the Bureau of Roads has asked for many more trucks.

Studebaker Makes Further Price Cut

SOUTH BEND, IND., Dec. 13—The Studebaker Corp. has reduced prices on two models of its Light Six series. The Landau roadster is cut from \$1850 to \$1650 and the sedan from \$2450 to \$2150.

KELLY-SPRINGFIELD TRUCK CUT

NEW YORK, Dec. 13—Reductions in the prices of Kelly-Springfield trucks have been announced by Hare's Motors, Inc., ranging from \$100 on the 1½-ton model to \$400 on the 6-ton size. The new prices on the chassis at Springfield, Ohio, are, 1½-ton from \$3000 to \$2900; 2½-ton, \$3500 to \$3250; 3½-ton, \$4650 to \$4200; 5-ton, \$5150 to \$4900; 6-ton, \$5500 to \$5100.

Belgian Show Draws 309 Exhibitors

**Fourteen American Cars Represented in Seventy-six Shown
—Draws Large Attendance**

(By Cable to AUTOMOTIVE INDUSTRIES)

BRUSSELS, Dec. 13—Burgomaster Max, one of the civic heroes of the war, opened Belgium's first post-war automobile show, the only Continental exhibition of the year, in the Cinquantenaire Palace in this city Saturday. King Albert, one of Europe's most enthusiastic motorists, visited the show to-day.

The exhibition is International in character, covering the entire automotive industry, and brings together 309 exhibitors, establishing a new record. Seventy-six passenger car manufacturers have stands. Forty of them are French, 14 American, 10 Belgian, 6 Italian, 4 British, 1 Swiss and 1 Dutch. There is not a single German or Austrian exhibitor. The American firms showing passenger cars are Buick, Chevrolet, Comet, Maxwell, Chalmers, Dodge, Overland, Oldsmobile, Packard, Paige, Saxon, Stephens, Westcott and Willys-Knight.

The show marks the return of the Belgian automotive industry to pre-war conditions. With only a few exceptions all the Belgian factories are now producing on the same scale as before the war. The industry has not grown and a few new firms have appeared, but three companies have not returned to the automobile business. They are Pipe, Germain and Sava.

The Belgian automobile factory buildings were not destroyed in the war, but the machinery was taken away by the Germans and twenty-five months have been necessary to assemble new equipment, lay out designs and get into production.

Despite this handicap, the Belgians have revived as quickly as the French or British. Minerva, the largest automobile factory in Belgium, is running on the same scale as before the war and producing up to 75 per cent of the factory capacity. Metallurgique also is in full production.

Belgian Car Market Open

Belgium is the only country in Europe which has maintained pre-war import duties, and as a result the market is being extensively invaded by American manufacturers. Before the war practically no American cars were sold in this country, while now twenty firms have selling organizations. American cars are found everywhere. Cadillac maintains permanent display in the lobby of the leading Brussels hotel. Belgian manufacturers two years ago protested against the invasion of their market, but the government has refused to give them protection.

Although general depression is felt here the tone is optimistic and trade conditions are rather more satisfactory than

in the other countries of Europe. Attendance at the show thus far has been good, and much buying is expected before it closes.

Ansaldò, the biggest engineering concern in Italy, has entered the automobile field and exhibits for the first time a light, cheap production car with overhead valve, four-cylinder engine, 70 x 120 mm. (2.76 x 4.73 in.), with three-speed gearset and Hotchkiss drive.

Fonck, the famous French aviator, has come into the automobile field with a high class model of the sporting type equipped with a four-cylinder engine, 80 x 130 mm. (3.15 x 5.12 in.). Another model of similar design has eight cylinders in line, four-wheel brakes and left-hand steering gear, the product of an engineer from Hispano.

Renault Modifies Model

Renault has modified his Six and now has cantilever springs without shackles. Lorraine-Dietrich shows a new light, cheap-production Six with modifications, now ready for production. Delivery is promised in February. Lorraine has absorbed Clement-Bayard.

Excelsior has brought out a new high grade six with cantilever springs and four-wheel brakes. Metallurgique shows a new four-cylinder model, 100 x 160 mm. (3.94 x 6.30 in.) of unit construction with four-speed gearset. The engine will be replaced later by a six of the same dimensions. Four-wheel brakes are used, with semi-elliptic springs. The car uses complete Bosch equipment.

Daoust is in production of a cheap popular car and is also building a sporting type with an engine of 183 cu. in. with overhead valves. Miesse has two new models with four and eight cylinders in-line, detachable head, overhead valves and four-wheel brakes.

Parts of American Manufacture

The engines used generally are of Belgian production, but the clutches and gearboxes are imported from America. No Belgian organization is equipped for quantity production of cheap cars. A majority of the makers prefer to make a limited number of high class vehicles. There is no battery ignition in Belgium and all final drives are spiral bevel.

All the trucks shown are of foreign make, mostly French. Farm tractors are beginning to arouse interest, but none are produced in Belgium. There are a few farm lighting sets at the show, including the American Delco.

Firestone Net Profits \$9,396,912 for Year

AKRON, Dec. 15—The Firestone Tire & Rubber Co. made a net profit during the past fiscal year of \$9,396,912 after setting aside \$8,151,749 for inventory losses, according to the annual statement to the stockholders issued to-day.

The total sales amounted to \$114,980,969 which is an increase of 26 per cent over the sales of last year. According to the statement the total assets amount to \$107,404,200.

Banks Add to Share in Standard Parts

Stockholders' Share in New Financing Cut \$1,000,000—Subscriptions Near Close

CLEVELAND, Dec. 13—The plan for financing the Standard Parts Co. has been amended and it is now hoped to have the receivers who were appointed in September on the application of a stockholder, discharged early in the new year. The amended plan provides for increasing the amount of prior lien stock from \$3,000,000 to \$4,000,000, while the amount of Class A Preferred was reduced from \$6,500,000 to \$5,000,000, making the total \$9,500,000.

The proposed syndicate of brokers will take \$4,200,000 of the 8 per cent prior lien preferred instead of the \$3,000,000 provided in the first refinancing plan. The stockholders will be required to take \$2,000,000 of the second preferred instead of the \$3,000,000 originally sought from them.

The original refinancing plan was drafted and submitted to the stockholders in October. They were given to Dec. 1 to subscribe to the \$3,000,000 originally set aside. It was announced that of the \$2,000,000 stock now set aside for the stockholders to take all but \$110,000 has been taken up. With the banks giving a \$4,000,000 credit, conditioned on the stockholders taking \$2,000,000 of the new stock, and the brokers underwriting \$4,200,000 worth, the company will have \$10,200,000 as a nest egg for the readjustment period.

The decision to amend the refinancing plan was made at a meeting of interested persons in the office of the Cleveland Trust Co.

Rubber Companies Deny Consolidation Report

NEW YORK, Dec. 13—Reports that a consolidation is imminent of the Kelly-Springfield Tire & Rubber Co., the Goodyear Tire & Rubber Co. and the B. F. Goodrich Co. are emphatically denied by officers of the three rubber companies. It is assumed the story results from the fact that Arthur Sachs of Goldman, Sachs & Co. has been elected to the directorate of all three corporations. The Goodyear and Goodrich companies have a greater manufacturing capacity than they will need for some time, and the Kelly-Springfield is now completing a new plant which will have a larger capacity than its three present factories.

Another report that Henry Ford had entered into negotiations with the Kelly-Springfield company for the purchase of its Akron plant also is emphatically denied by officers of the tire company.

The Kelly-Springfield company has declared a quarterly dividend of \$1.50 on the 6 per cent preferred stock of the corporation. The dividend is payable Jan. 1 to stockholders of record Dec. 17.

Farmer Convention Analyzes Conditions

Find Crop Losses and Loss to Industry Unequal—Bank Position Studied

INDIANAPOLIS, Dec. 10—The co-operative movement among farmers through the organization known as the American Farm Bureau Federation, was well demonstrated here during the last three days when this organization representing over 1,000,000 farmers from forty states, met in its second annual convention with an attendance of over 600 delegates.

The American Farm Bureau Federation is a federation of farm bureaus which are generally headed by an agricultural college graduate who is an active worker in his locality. This new organization gives promise of being by far the most potential ever connected with American agriculture. It is a business organization and is attacking every important problem that has the ultimate benefiting of agriculture in view.

Governor P. G. Harding of the Federal Reserve Board was present to answer the criticisms of the farmers that the Federal Reserve Banking system was favoring the manufacturing and business interests of America rather than the farming interests. Governor Harding answered this by showing how loans in the New York area were reduced during the last year by approximately \$1,500,000,000, while loans in agricultural areas were increased by approximately \$5,800,000,000. Federal Reserve Banks in such industrial centers as Philadelphia, Boston, and Cleveland each advanced approximately \$250,000,000 to Federal Reserve Banks in agricultural areas to assist in financing the farmer. Governor Harding was emphatic in stating that there had been no restriction of credit by the Federal Reserve organization to the farmer.

Farm Buying Could Halt Slump

He was of the opinion that the present depression is largely an evidence of the lack of buying on the part of the farmers.

Some conception of how the farmer is analyzing present-day situations was given by J. R. Howard, president of the American Farm Bureau of Federation, and a farmer of high standing. Howard declared that the present reduction in prices on three crops—corn, winter wheat and oats—meant a loss of \$7,000,000,000 to the farmers of the country. He cited the drop in the price of corn from \$1.85 a bushel to 35 cents a bushel which applied to the 3,200,000,000 bushel crop this year. This gave a loss alone of approximately \$5,000,000,000. With wheat the loss is another billion, and with oats it is practically the same.

The farmer cannot quite reconcile the reduction in prices which he is facing on his products with the much smaller

losses or reductions of 10 to 25 per cent which the manufacturer is making in his products, he declared. Howard asserted the farmer during the period of the war, in spite of the impressions of the general public to the contrary, did not fare comparably with industry. He advocated a banking system which would give farmers a credit that would extend over the productive year and also through the consumptive year. He even went so far as to declare that if present banking organizations would not furnish this that the farmers would be compelled to organize their own banking institutions for this purpose.

Urge Road Construction

Henry Sherley, secretary of the Federal Highway Council, urged the necessity of asking Congress to make appropriations for road improvements. His plan was to have the Federal Government construct certain roads and charge local authorities with maintenance of their own sectors. Deal urged the harmonization of road construction and maintenance between the Federal, State and county governments.

The action of the Federation on the resolutions submitted gave some indication of the views the farmer is taking on many of the questions of the day. Some of these are in purpose as follows:

Farm Bureaus of each State and county to appoint committees to consider taxation; and the American Farm Bureau Federation to give special attention to Federal taxes through its legislative department.

Railroads should give preferential rates on agricultural limestone, rock phosphates, and soil fertilizers.

The Federation is opposed to the Pittsburgh plus plan as a basis for its steel prices.

The farmers are opposed to guaranteeing a fixed return to public utilities and railroads on a cost plus basis.

The Federation reiterated its unalterable opposition to the enactment of any kind of daylight saving law.

There should be national legislation to assure the farmers the full, free and unrestricted right to bargain collectively.

From this Congress must enact a tariff law which will give the farmers that measure of protection which may be necessary to equalize the difference between the cost of production in this country and the cost in competing nations.

For Profits and Income Tax

The attitude of the Federation with regard to Federal taxes, as expressed by H. C. McKenzie, chairman of their taxation committee, is that 75 per cent of the Federal taxes should be income and excess profit and 25 per cent consumer taxes. The Federation favors a continuation of the present excess profit taxation scheme. The Federation is opposed to sales tax. McKenzie recommended that if the present income and excess profit taxes do not raise sufficient revenue, that the rates be raised on incomes between \$10,000,000 and \$50,000,000 to make up the difference.

Ford to Make Truck to Sell at \$1,000

New Model, 3½ Ton, in Production in June—To Cut Tractor Price

NEW YORK, Dec. 15—Persistent and apparently authoritative reports have been heard in truck circles here this week to the effect that Henry Ford has completed experimental work on a 3½-ton truck which will be sold either at \$1,000 or \$1,200. It is understood production will start some time next year, perhaps as early as June.

There also are what seem like well-founded reports that Ford will make material reductions next year in the prices of his touring car and tractor. There is said to be little probability of Ford putting a new passenger car on the market in the near future, although considerable experimental work has been done along this line.

Officials Decline Comment

DETROIT, Dec. 16—Officials of the Ford Motor Co. refuse either to affirm or deny reports that a 3½-ton truck will be put on the market soon or that further price cuts are in contemplation.

Testimony Is Taken In Tire Price Probe

AKRON, Dec. 15—Witnesses are giving evidence at Cleveland this week in an investigation instituted by the United States Department of Justice to determine whether or not there has been collusion among the leading tire manufacturing companies in fixing prices. The investigation has been under way for the past six months, and agents of Attorney-General Palmer are said to have found what they consider sufficient evidence to warrant action. Numerous witnesses have gone to Cleveland from Akron and other cities. Unofficially, the tire companies assert emphatically that they never have entered into combinations to control prices.

OVERLAND PASSES DIVIDEND

NEW YORK, Dec. 15—Directors of the Willys-Overland Co. decided to-day to pass the regular quarterly dividend of 1½ per cent on the preferred stock. The action taken was to conserve cash, it was said, and the dividend for the full year has been earned several times over. This action by the directors already had been discounted. The annual report of the company shows assets on Nov. 30 to total \$125,000,000. Of these approximately \$4,500,000 consists of cash. Current liabilities in the fiscal year were reduced \$18,000,000 to \$26,750,000.

INDUSTRIAL NOTES

Ladish Drop Forge Co., Cudahy, a suburb of Milwaukee, and regarded as one of the largest producers of automotive forgings in the West, has suspended operations pending a readjustment of the business situation. Frank Ladish, secretary and treasurer of the company, expressed the hope that conditions will improve sufficiently by Jan. 1 to enable it to resume production on at least a partial scale.

Federal Rubber Co., Cudahy, suburb of Milwaukee, has effected a reduction in its working schedule to meet the slackened demand for tires, tubes and other rubber goods. All shops will close at 4:10, instead of 5:10 p. m., daily. The Federal is the last of the large tire concerns to reduce production, the degree of which, however, is relatively light.

International Harvester Co. plans establishment in Milwaukee, where it maintains one of its principal plants, of a five-story warehouse and assembling building, 100 x 150 ft., for the gas engine, tractor and truck departments of the Milwaukee works. The first unit will be erected at once, the remainder being planned for a period of two years.

Master Self-Locking Differential Mfg. Co., which was incorporated in October with \$250,000 capital by a number of Wisconsin engineers, has selected Green Bay, Wis., as the permanent location of the industry. A one-story fireproof machine shop, 60 x 100 ft., is being erected and is to be equipped ready for operations on Jan. 1.

Bay City Automobile Body Co., Bay City, Mich., has completed work on six of the 80 government trucks shipped here recently for reconstruction for use in mail service. The trucks were built by the Denby Truck Co. for the government to be used in overseas service during the war.

Powerton Tire Corp., organized in Buffalo in 1917, has just completed its new plant in Rochester. Up to last year the Powerton tires were manufactured in Muskegon, Mich., but in order to have the factory near the main office in Buffalo it was decided to locate in Rochester.

Tiger Tire & Rubber Co., Ltd., expects to begin the manufacture of automobile tires and tubes at Belleville, Ont., early this month. H. H. Hastings is general manager of the company. The capitalization is \$2,000,000.

Grand Rapids Tire & Rubber Co. has completed one-third of its plant and will start production of about 200 cord tires daily. When the entire plant is completed the output will be about 800 daily.

Waltham Motors Corp. has purchased the business of the Victor Motor Truck & Trailer Co., Chicago. It will discontinue the Victor truck, but will make a 1½-ton truck under the trade name Waltham.

Adrian Tractor Co., Adrian, Mich., has bought an eight-acre site on the D. T. & I. tracks in the southeast portion of the city. Plans of the company for building operations have not been announced.

White Mfg. Co. has been incorporated at Goshen, Ind., and has purchased the Alford Motor & Machine Co. and the Goshen Motor Works. A general manufacturing business will be conducted.

Devices Industry, Inc., Oshkosh, Wis., has completed its new plant and will largely increase its production of a patented "free service" air pump for garage and curb installation.

B-J Steam-Gas Generator Co., Lowell, Mich., has broken ground for a foundry and factory that will employ 200 men. The company has offices in Grand Rapids.

American Bosch Magneto Corp. has reduced production for December to 7000, as compared with 15,000 in November and the peak of 44,000 in July.

Grand Rapids Malleable Co., Fuller Junction, Mich., is building a coal pulverizing plant, 35 by 65 ft. and 50 ft. high, at an expenditure of \$100,000.

Ideal Foundry Co., Grand Rapids, Mich., has let a contract for construction of an addition to its plant to permit the installation of 12 brass furnaces.

Waukesha Motor Co., Waukesha, Wis., is purchasing additional machine tool and other production equipment estimated to cost more than \$100,000.

Cumberland Tire & Rubber Co., Louisville, Ky., has completed its textile and tire factories and is now ready to begin production.

Auto-Lite Co., Toledo, has suspended work until after the first of the year, throwing 450 workers out of employment temporarily.

Neville Steering Wheel & Mfg. Co., Detroit, has moved to Wayne, Mich., where it will have tripled manufacturing facilities.

Sinclair Foreclosure
Deferred Until April

SPRINGFIELD, MASS., Dec. 11—Charles Margerum of Hartford, Conn., has been appointed by Referee in Bankruptcy C. W. Bosworth as trustee in bankruptcy of the Sinclair Motors Corp. with bonds set at \$25,000. The liabilities of the corporation are stated to be \$547,958.26 and the total assets \$1,740,520.72. The hearing yesterday was largely attended, there being a large number of workmen with small claims present. The petition in bankruptcy was filed Oct. 1 and later the corporation was adjudged to be in bankruptcy by the United States Court in Boston.

The hearing also represented the first meeting of the Sinclair creditors, who, after the appointment of trustee, adjourned to discuss the situation. It was the consensus of the creditors present, presided over by Attorney E. H. Brewster, that the Sinclair corporation should be given a reasonable opportunity to get back on its feet. With this end in view it was decided to have the trustee, as far as he is legally empowered to act, ask the Knox Motor Works not to foreclose a mortgage on the Sinclair plant, procedure scheduled for Dec. 20, and the creditors allowed the Sinclair people an extension to April 21, for the purpose of bringing about an adjustment of all difficulties.

FULTON BUYS CANADIAN SITE

WELLAND, ONT., Dec. 11—Fulton Motors, Ltd., of Farmingdale, N. Y., decided this week to locate its Canadian plant here. The plant and property of the Canadian Automatic Transportation Co. has been secured by the motor truck concern. The site consists of 4½ acres, and additional buildings will be erected. Machinery has already been shipped to the Welland plant.

METAL MARKETS

A MORE cheerful tone is beginning to make itself felt in the metal markets. Following the upheaval brought about by the first genuine movement toward deflation, values are beginning to steady, and, while here and there, as for instance in pig iron prices, some ironing out of unnatural bulges remains to be done, a smoother and more dependable course appears to be opening up for the purchasing agent. Somewhat of an innovation appears to have been inaugurated by the Ford Motor Co., which is reported to be supplying automotive foundries working on castings for Ford cars and tractors with foundry pig at as low as \$31 and malleable at \$32, levels about 15 per cent lower than those quoted by the sales agents for merchant furnaces. The latter quotations, however, must still be considered as strictly nominal. In the finished steel market the outstanding feature from an automotive point of view is that the Corporation's prices for sheets have become the maximum. It is only natural that now there should be considerable speculation as to the probable future of independents' prices. If there continues to be a sharp deficiency of demand—a contingency that must be figured with for at least the first quarter of the new year—it is supposed that intensive competition for what business is available will lead to cuts under the Corporation's prices. These cuts, if they ensue, will, however, vary considerably between different products, depending entirely upon the particular situation in each product. Moreover, the opinion of unbiased market observers inclines to the belief that these cuts will, at best, be slight, for the following reasons: In the first place, in common with all other industries, steel makers are confident that the present period of recession in the demand is only temporary and that the late spring will witness a resumption of at least 80 per cent operations. The second consideration is that now the time has come when the industry will reap the full benefit of the stabilizing value of the Corporation's price schedule adhered to by the chief interest since early last year. From the independents' point of view, the Corporation's levels did impose certain restrictions upon them during the summer flurry, even though premiums soared, and now they would be cutting their nose to spite their face did they ignore the psychological fact that the consumer, who for many months was unable to obtain steel at the Corporation's prices, has come to look upon the latter as a FAIR price. So, why slash them more than absolutely necessary?

Pig Iron—Automotive foundries operating in the Detroit district have been offered foundry, silicon 1.75 to 2.25, at \$36, Detroit furnace. The seller of practically all the merchant iron produced in the Chicago district, quotes \$38, Chicago furnace, for the same grade. The market appears to continue in a state of flux.

Steel—A Corporation subsidiary is reported to have quoted cold rolled strip steel at 6.25c. base; the market, on the whole, ranging, however, up to 6.75c. Hot rolled strip is quotable at 4c. Sheets have settled on the Corporation's price basis.

Aluminum—Sellers in the "outside" market ask about 1c. more for first quarter 1921 maturities than spot metal is obtainable for. The sole American producer adheres to previous contract price. The undertone of the market displays a firmer tendency.

Copper—Save for occasional spells of temporary weakness incidental to reconvalescence, the market is in good shape, drastic cuts in production acting as additional support. Those who bought at 13½c. have nothing to be sorry for.

Automotive Financial Notes

Kearney & Trecker Co., Milwaukee, has reincorporated under the laws of Wisconsin as the **Kearney & Trecker Corp.**, with an authorized capitalization of \$2,500,000. The company was founded in 1898 by E. J. Kearney and Theodore Trecker in a small shop. It now occupies a large tract in West Allis, the manufacturing suburb of Milwaukee. Its principal owners also hold the major share in the **LeRoi Co.**, manufacturing passenger, commercial car and tractor engines at Milwaukee.

Stromberg Carburetor Co. of America, Inc., for the three months ended Sept. 30, reports surplus after charges and Federal taxes of \$87,603, equal to \$1.17 a share on the 75,000 shares of capital stock. This compares with a surplus of \$202,478, or \$2.72 a share in the preceding quarter, and of \$102,342 or \$2.04 a share in the September, 1919, quarter. A quarterly dividend of 50 cents a share will be paid Jan. 3. The company has been paying \$1 a share each quarter.

Melgs-Powell Co., Milwaukee, manufacturer of machine and manual tools, gages, micrometers, etc., has increased its capital stock from \$50,000 to the equivalent of \$150,000 and enlarged its directorate from three members to five. Several months ago the company moved into a three-story shop building of its own, and it has installed much new equipment to increase production.

Perfection Tire & Rubber Co., through Chairman of the Board Robinson, declares itself free of entanglements or troubles which have overcome the Industrial Securities Co., all contractual and fiscal relations having been severed at the last annual meeting in February. The company will need \$1,000,000 in new capital annually for five years to meet production requirements.

Stinson Tractor Co., Minneapolis, is marketing a new issue of \$250,000 of capital stock to finance important enlargement of the plant. Superior capital will invest about \$75,000 through the local Civic and Commerce Association. The remainder is being subscribed by outside interests.

Wisconsin Electric Welder Co. has been incorporated at Milwaukee with a capital stock of \$150,000 by E. H. Mills, L. U. Poppe and C. F. Runge. It is chartered to manufacture and deal in machinery of all kinds, particularly equipment for welding and cutting metals by electricity.

Detroit, Toledo & Ironton Railroad reports gross earnings of \$598,054 in October, compared with \$430,830 in Oct., 1919. Net operating deficit after taxes was \$156,284, compared with net operating income of \$5,843 in the same month last year.

Gardner Turbine Muffler Co. has been organized at Traverse City, Mich., with David Stark, president and general manager, and G. W. Garner, vice-president and superintendent. The concern is capitalized at \$50,000 paid in and will begin production immediately.

Times Square Auto Supply Co. has declared the usual quarterly dividend of 6½ cents a share payable Jan. 27 in 8 per cent scrip dated Jan. 27 and due Jan. 27, 1922. The scrip is convertible at maturity into stock at \$20 a share.

Kelly-Springfield Tire Co. has renewed the lease on its building in New York for twenty years at a rental aggregating \$1,000,000. The plant at Cumberland, Md., costing \$10,000,000, will soon be in production.

Port Houston Tire & Rubber Co., capitalized at \$1,000,000, has acquired the Universal Tire & Rubber Assn. at Houston and will resume operation of the plant early next year. Manufacturing facilities will be increased.

Hartford Automotive Parts Co. has increased its capital stock from \$1,500,000 to \$2,000,000 through the issuance of 10,000 additional shares (par \$50).

Hupp Motor Car Corp. has declared a quarterly dividend of 1¼ per cent on the 7 per cent cumulative preferred stock, payable Jan. 2.

Dellon Tire & Rubber Co. has declared a regular quarterly dividend of 2 per cent on the preferred stock, payable Jan. 2.

Ajax Rubber Co. paid a quarterly dividend of \$1 Dec. 15.

G. M. C. Considers Change in Stock Dividends

NEW YORK, Dec. 13—It is expected that when the directors of the General Motors Corp. meet for dividend action later this month they will declare only the 25 cents a share quarterly on the common stock and discontinue the payment of one-fortieth of a share in stock on the common which was begun this year. The financial interests now in control of the company believe stock dividends are unwise at present because most of the shares thus distributed are thrown upon the market and tend to keep down the quoted value of the stock. A quarterly dividend of one-fortieth of a share in stock on the common capitalization of 20,000,000 shares would amount in a year to 2,000,000 shares, or 10 per cent. It is felt stockholders would derive greater benefit from a lump stock dividend every two or three years.

Since the retirement of W. C. Durant and the assumption of control by the DuPont and Morgan interests there has been less talk of refinancing for General Motors and there is little probability of any steps in this direction in the near future. There has been talk of \$50,000,000 as the sum needed. While there has been a heavy shrinkage in the company's business, as has been the case with all automobile companies, it is in a strong financial position and its inventory has been greatly reduced.

New Departure Upheld in Suit on Patents

NEW HAVEN, Dec. 13—Federal Judge Edward L. Garvin has filed a decision in favor of the New Departure Mfg. Co. of Bristol in its suit against the Rockwell-Drake Corp., Marlin-Rockwell Corp. and Albert F. Rockwell, former president of the New Departure company. The decree provides:

"1. That the court enjoin the defendants from further manufacture, using or selling those double-row ball bearings which infringe New Departure patents.

"2. That the court order an accounting and give to the New Departure Mfg. Co. the profits which that accounting shows that the defendants have made from the infringement, and also give to the plaintiff the damages the plaintiff has suffered from that infringement.

"3. That the court order the defendants to pay the costs of the suit."

Bank Credits

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

NEW YORK, Dec. 16—The approach of the year-end and mid-month settlements has tended apparently to keep money rates firm during the last week. In spite of further liquidations in the stock market, which carried railroads down with the general list, call money remained at 7 per cent throughout the week, as compared with a ruling rate of 7 per cent and a range of 6 per cent to 7 per cent a week ago.

Time money was slightly firmer last week, with quotations practically nominal, however, at 7¼ per cent to 7½ per cent for 60 to 90 day paper secured by regular mixed collateral, as against 7¼ per cent the previous week. Four, five and six month paper rates were at 7 per cent to 7¼ per cent, as compared with 6½ per cent a week earlier. Rates for loans secured by all industrial collateral were quoted at about ¼ per cent, as compared with 6½ per cent a week earlier. Rates for loans secured by all industrial collateral were quoted at about ¼ per cent above the rates on mixed collateral loans.

The most noteworthy feature of the week-end statement of the New York Associated Banks was the \$43,668,000 increase in net demand deposits. Loans declined \$619,000 and net time deposits \$11,213,000. Excess reserves over legal requirements at \$11,247,910, marking a decline of \$10,733,130, were practically cut in half, a result, in part, of a reduction in reserve deposits at the Reserve Bank.

The New York Federal Reserve Bank showed an improved reserve condition. Total gold reserves last week increased \$10,676,694 over the previous week, and total cash reserves increased \$12,147,901. Total bills on hand declined \$41,420,202. Net deposits were down \$8,330,140, and total earning assets declined \$30,955,557. Federal Reserve notes in actual circulation at this center declined \$9,800,290.

STOUGHTON PLANT REOPENS

STOUGHTON, WIS., Dec. 13—After being virtually closed down for more than six weeks, the Stoughton (Wis.) branch works of the Moline Plow Co. has resumed operations with a force of between 40 and 50 per cent. New business is being received in fair volume and it is hoped to increase production steadily. The foundry, machine and forge shops and manure spreader department are now in operation.

Men of the Industry

Ethan Viall, editor-in-chief of the *American Machinist*, and for ten years a member of its staff, has resigned to become a partner in the firm of T. W. Minton & Co., Barbourville, Ky., the largest producer of hickory dimension stock in the country. Previous to joining the staff of the *American Machinist* Viall was for three years associate editor of *Machinery*, and before that was for fourteen years foreman and superintendent in several of the largest specialty plants in the Middle West. He is author of *Broaches and Broaching*, *Gas Torch and Thermit Welding*, *Electric Welding* and other engineering books. He is a member of the Society of Automotive Engineers, the American Society of Mechanical Engineers and the American Institute of Electrical Engineers.

W. H. Williams, former general sales manager for the Hart-Papp Co. and for the past year sales manager of the Eagle Mfg. Co., has joined the sales force of the United States Tractor & Machinery Co., Menasha, Wis. His headquarters will be in Minneapolis. M. R. Showalter and C. W. Lucey have been made branch managers in Kansas City and Springfield, Ill., respectively.

Herbert Chase, formerly treasurer and assistant secretary of the Society of Automotive Engineers, has joined the editorial staff of *AUTOMOTIVE INDUSTRIES*. He has had extensive experience in research and other engineering work with the Automobile Club of America and in editorial work in connection with S. A. E. publications.

A. O. Williams has been appointed secretary of the Automotive Association of the Cleveland Chamber of Commerce. He has had considerable experience in selling in both commercial and passenger car lines. He is to devote his entire time to the secretaryship and will succeed Clifford Brown.

John J. Kroha, formerly with the paint engineering department of the Patton Paint Co., Milwaukee, has joined the forces of the W. E. Seymour Mfg. Corp., Milwaukee, makers of pistons and piston rings, as secretary and sales manager.

Governor Alfred E. Smith of New York will become chairman of the board of the United States Trucking Corp., New York, effective Jan. 3, 1921. Before entering politics Governor Smith had been associated with his father in a trucking business in New York.

J. L. Adams has been made manager of the Miller Rubber Co. branch at Houston, Texas. L. Crain, who has been a salesman out of Houston, has been appointed manager of the San Antonio branch.

Capt. Eddie V. Rickenbacker, American Ace and former racing driver, has been named vice-president and general manager of the California company, which will handle Sheridan distribution in that State.

W. J. Foster, formerly assistant truck sales manager of the New York Packard branch, has been named transportation engineer and assistant to the truck sales manager of Hare's Motors.

Arthur J. McElhone will join the organization of the Byron G. Moon Co., Inc., Troy, N. Y., in January as an account executive specializing in the automotive and allied industries.

P. V. Burwell has been made assistant advertising manager of the Black & Decker Mfg. Co., Baltimore. G. W. Brogan is head of the department.

C. W. Couch, formerly sales manager of the Ford-Clark Co., has formed a selling organization under the name of C. W. Couch & Co., with offices in Cleveland.

R. J. Fitness has been appointed consulting engineer and manager of the Detroit business of the Intercolonial Export Agencies, Ltd., of Montreal.

Earl W. McGooking has rejoined the W. R. Johnston Mfg. Co., Chicago, as factory representative in Michigan and Ohio.

H. E. Crocker has been made Boston district manager for the United States Tire Co.

Chapin and Raskob on Finance Committee

CHICAGO, Dec. 13—The automotive industry is well represented on the committee appointed to supervise the formation of the proposed Foreign Trade Financing Corp., which will have a capital of \$100,000,000 and a capacity for carrying \$1,000,000,000 worth of business on its books. The committee is headed by John McHugh of New York and includes some of the most prominent bankers and financiers of the United States. The automotive representatives are Roy D. Chapin of Detroit, president of the Hudson Motor Car Co., and John S. Raskob, a director of the General Motors Corp., and a leader in the councils of the Du Pont family. The committee was named at a conference of more than 200 bankers in this city. The committee will immediately begin gathering subscriptions to provide for the preliminary expenses of the organization.

FALLS MOTORS NAMES NEW HEAD

MILWAUKEE, Dec. 11—A number of changes in the official personnel of the Falls Motors Corp., Sheboygan Falls, have been announced. H. W. Dilden, son of the president of the Fort Dearborn National Bank of Chicago, has been elected president. E. W. Ramsdell of Chicago continues as vice-president. Henry Landwehr of Sheboygan becomes treasurer to succeed Konrad Schreier, Jr., who will enter another business in Chicago on Dec. 1. Landwehr has been auditor and is succeeded in that position by T. C. Widder.

ANTIGO BUYS MURRAY-MYLREA

ANTIGO, WIS., Dec. 13—Instead of building a new plant, as originally intended, the Antigo Tractor Co., organized several months ago at Antigo, Wis., with an authorized capitalization of \$500,000, has acquired the foundry and machine shop of the Murray-Mylrea Co. at Antigo, taking possession at once. The Murray-Mylrea Co. manufactured logging and sawmill machinery, but for some time has been building a limited number of tractors for the new company under contract. The tractor design em-

ploys a quadruple drive and will be known as the "Four Wheel Pull" tractor. D. S. Stewart, a pioneer in automotive engineering in the Middle West and one of the first builders of a practical tractor, is chief engineer and a director of the Antigo company. The other officers are: President, Charles W. Fish; vice-presidents, L. P. Tradewell and William H. Wolpert; secretary, E. A. Yahr; treasurer, Ernest Hirt; directors, John Manser, J. R. McQuillan, E. P. Faust. The enterprise has been financed exclusively by loggers, lumber manufacturers and other business men of Antigo and vicinity.

Reynolds Creditors to Determine Action

MT. CLEMENS, MICH., Dec. 10—Hearing on the petition for the appointment of a permanent receiver of the Reynolds Motor Truck Co. of this city will be held in the Circuit Court here Dec. 20. A decision will be reached at that time, also, whether or not to continue the manufacturing of trucks in order to utilize the assets of the company to the best interests of the creditors. The present temporary receiver is Charles J. Reinold.

Since the meeting of the creditors in October, A. A. Lehr, formerly the vice-president and general manager of the company, submitted to the directors a proposition which he had received to buy up all the outstanding stock at full par value on the preferred stock and 15 per cent of the par value on common stock. This proposition it is understood also carried with it an agreement to pay off all claims against the corporation at once at 100 cents on the dollar, but it is said that this offer has been definitely refused by the directors.

The total liabilities are more than \$135,000 and the assets will not exceed \$165,000.

DAYTON RECEIVER NAMED

DAYTON, OHIO, Dec. 13—H. J. Oakes has been appointed temporary receiver for the Dayton Metal Body Co. and has been authorized to continue the business. The company manufactures metal bodies for Ford cars and when orders now on hand are completed, it is believed it will be possible to lift the receivership.

DUNLOP DIRECTORS RETIRE

NEW YORK, Dec. 13—A cable dispatch from London says that Messrs. White and Ormrod, directors of the Beecham Trust Co., have retired from the board of the Dunlop Rubber Co. They have been responsible for the financial policy of the company in recent years. The market for Dunlop stock has been very weak in London for some time past.

CLINTON W. ATWOOD DIES

DANIELSON, CONN., Dec. 10—Clinton W. Atwood, president and treasurer of the Williamsville Buff Mfg. Co., died Dec. 1.

Calendar

SHOWS

- Dec. 18-24—New Orleans, Annual Automobile Show, New Orleans Automobile Dealers Ass'n, Abbott Bldg.
- Jan. 3-8—New York, Motor Truck Show, Motor Truck Ass'n of America, Twelfth Regiment Armory.
- Jan. 8-15—New York, National Passenger Car Show, Grand Central Palace, Auspices of N.A.C.C.
- Jan. 10-17—Portland, Ore., Annual Automobile Show, Automobile Dealers' Ass'n, Municipal Auditorium, M. O. Wilkins, Mgr.
- Jan. 15-29—Philadelphia, Annual Automobile Show, Philadelphia Automobile Trade Ass'n.
- Jan. 17-23—Milwaukee, Annual Automobile Show, Milwaukee Automotive Dealers' Ass'n.
- Jan. 22-27—San Francisco, Second Annual Pacific Coast Automotive Equipment Exposition, Auditorium.
- Jan. 22-29—Baltimore, Annual Automobile Show, Baltimore, Automobile Dealers' Ass'n, 5th Regiment Armory, J. C. O'Brien, Mgr.
- Jan. 22-29—Cleveland, Annual Passenger Car Show, Cleveland Mfr's & Dealers' Ass'n, Wigmor Coliseum.
- Jan. 22-29—Montreal, Annual Automobile Show, Montreal Automobile Trade Ass'n, Motordrome Bldg.
- Jan. 29-Feb. 4—Chicago, National Passenger Car Show, Coliseum, Auspices of N.A.C.C.
- Feb. 5-12—Minneapolis, Annual Automobile Show, Minneapolis Automobile Trade Ass'n.
- Feb. 6-12—Columbus, National Tractor Show, Columbus Tractor & Implement Club, Ohio State Fair Grounds.
- Feb. 12-19—Hartford, Conn., Annual Automobile Show, Hartford Automobile Dealers Ass'n, Armory, Arthur Fifoot, Mgr.
- Feb. 12-19—Kansas City, Annual Automobile Show, Kansas City Motor Car Dealers' Ass'n.
- Feb. 14-19—St. Louis, Annual Automobile Show, St. Louis Automobile Mfr's & Dealers' Ass'n, Robt. E. Lee, Mgr.
- Feb. 14-19—Winnipeg, Western Canada Automotive Equipment Show.
- Feb. 18-28—San Bernardino, Cal., National Orange Show, Fred M. Renfro, Mgr.
- Feb. 19-26—San Francisco, Fifth Annual Pacific Automobile Show, Exposition Auditorium, George Mahlgreen, Mgr.

- Feb. 21-26—Louisville, Annual Automobile Show, Louisville Automobile Dealers Ass'n, First Regiment Armory, C. L. Alderson, sec'y.
- Feb. 21-26—Salt Lake City, Annual Automobile Show, Intermountain Automotive Trades Ass'n, W. D. Rishal, Mgr.
- Mar. 2-10—Des Moines, Annual Automobile Show, Coliseum, C. G. Van Vliet, Mgr.
- Mar. 5-12—Brooklyn, Annual Automobile Show, Brooklyn Motor Vehicle Dealers' Ass'n, 23d Regiment Armory, George C. Lewis, chairman.
- Mar. 7-12—Syracuse, N. Y., Annual Automobile Show, Syracuse Automobile Dealers Ass'n, Armory, Howard H. Smith, Mgr.
- Mar. 7-12—Indianapolis, Annual Automobile Show, Indianapolis Automotive Trade Ass'n, Automobile Bldg., State Fair Grounds, John Orman, Mgr.
- Mar. 12-19—Boston, Annual Automobile Show, Mechanics Bldg. and South Armory.
- Mar. 14-19—Omaha, Annual Automobile Show, Omaha Automobile Trade Ass'n, Inc., Omaha Auditorium, C. G. Powell, Mgr.
- April 4-9—Seattle, Annual Automobile Show, Seattle Motor Car Dealers' Ass'n, Arena Hippodrome.

April—Chattanooga, Tenn., Spring Automobile Show, Chattanooga Automotive Trade Ass'n, Sunday Tabernacle, C. A. Noone, sec'y.

FOREIGN SHOWS

- Jan. 7—Sydney, Australian Motor Show.
- Jan. 22-29—Colombo, Ceylon Motor Show.
- Feb. 7—Delhi, India, Delhi Motor Show.
- Mar. 23-28—Witwatersrand Agricultural Show including machinery and motors sections.

CONVENTIONS

- Dec. 28-30—Chicago, Annual Meeting American Society of Agricultural Engineers.
- Jan. 7—New York, Advertising Managers Council, Motor & Accessory Manufacturers Ass'n.
- Jan. 11-13—S. A. E. Annual Meeting, New York City.
- Feb. 2-4—Chicago, First Annual Meeting, Automotive Electric Service Assn. Hotel La Salle.
- May 4-7—Cleveland, National Foreign Trade Council.
- Oct. 12-14, 1921—Chicago, Twenty-Eighth Annual Convention National Implement & Vehicle Ass'n.

N. A. C. C. Gets Rates at Hotels for Shows

NEW YORK, Dec. 14—The National Automobile Chamber of Commerce has sent letters to all the hotels in New York in an effort to get them on record as to their rates for automobile show week in this city. It has been learned that some of the larger hotels have contemplated a material increase in rates for that period. The largest in the city has indicated an intention of charging for a full week if the room is occupied for only two or three days and charging double rates for one in a room. Others of the larger hotels, however, have agreed to adhere to the regular schedules.

The N. A. C. C. has invited 25,000 automobile dealers from all parts of the country to be its guests for the show and it is not proposed to have them exploited by the hotels while they are here if it can be avoided. There is every reason to believe that the campaign now being conducted will result in the establishing of reasonable hotel rates for the week.

VIENNA WANTS FORD PLANT

DETROIT, Dec. 11—Austrian manufacturers and leading business men spent Friday and Saturday in conference with officials of the Ford Motor Co. urging Vienna as a distribution center for Ford products as well as other American goods. They urged the necessity of securing American products to supple-

ment the limited output in their own country in order to build up business to care for the thousands of destitute persons through the empire. The delegation was headed by G. N. Hanald, secretary of the Motor Car Association of Austria, and A. Pross Bussing, head of one of Austria's largest companies.

Deere Cuts Production on Farm Implements

MOLINE, ILL., Dec. 13—Deere & Co. will curtail production during the winter months, due to the lessening of demand for tractors and other agricultural implements and power farming machinery. There has been no general rule followed but each situation has been handled in accordance with its own merits. In some cases, there has been a reduction in the hours per week from fifty to forty. In other cases, a small reduction in force was found advisable. In making any reduction, care was exercised in giving the old and regular employees, married men and men owning homes, the preference.

PREST-O-LITE CLEARED

WASHINGTON, Dec. 13—Dismissal of its complaint of unfair competition against the Prest-O-Lite Co., Inc., of Indianapolis, was announced by the Federal Trade Commission. This company, which manufactures and sells acetylene in steel containers, leased thousands of containers for automobiles in the early days of the industry.

Eastern States to Keep Main Highways Open

WASHINGTON, Dec. 13—Thorough study of the snow-removal problem in the Eastern States conducted by J. L. Harrison, senior highway engineer, Bureau of Public Roads, shows that every effort will be made to keep the main highways open this winter to such an extent that motor trucks may continue service.

The maintenance departments of the various States will be charged with the responsibility of keeping the roads clear of snow though there are instances where the local authorities have promised to handle the problem effectively. According to the Federal engineer there are two distinct groups of activities, (1) the removal of snow from the highways and (2) preventive methods tending to keep it from blowing into the highways in objectionable quantity.

CORRECTION

The statement was made in AUTOMOTIVE INDUSTRIES last week, in an item announcing that the Ward-La France Truck Corp. had increased its capital to \$10,300,000, that the truck corporation was a subsidiary of the American La France Fire Engine Co. This was an error for the reason that the Ward-La France company has no connection whatever with the American La France Fire Engine Co. The latter has not done and does not contemplate any new financing.

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Development of Public Motor Transport in Germany

Use of trucks to supplement the railroads in handling passengers, freight and mails has been found necessary. These vehicles are operated in large fleets by highly trained staffs, the service being controlled by motor transportation companies owned by local governments. National Government provides the vehicles in return for stock in these companies. Post Office Department operating passenger vehicles.

By Benno R. Dierfeld*

PRIOR to the war the use of motor vehicles in public transport had not reached the same state in Germany as in some other countries, notably England. The principal reasons for this backwardness were that the capabilities and the economy of the commercial motor vehicle had not been sufficiently demonstrated, that but little practical experience had accumulated and that the Government authorities and the general public alike looked upon the new means of transport with disfavor. Even the subsidy plan of the Prussian Ministry of War, which was designed to promote the use of motor trucks by private concerns in their own business, was only moderately successful. The few private enterprises maintaining a commercial vehicle service for public use met the demand for transportation in only a very inadequate manner. These services suffered from

poor technical management, poorly equipped repair-shops and excessive operating costs.

Saxony, Bavaria and Baden maintained state motor bus services in districts without railroads, with comparatively favorable results, but in the remainder of Germany there were no such motor bus lines. When war broke out, the motor services in the three states mentioned were discontinued, the omnibuses being requisitioned for military purposes, and, besides, the shortage of fuel would have made it impossible to operate them privately in any case. It was soon shown, however, that commercial motor vehicles were indispensable, and before the war came to an end, a motor traffic organization was created whose operations extend over the whole country.

Toward the end of 1916 there arose a transport crisis in some of the large cities of the empire, due to the enormous amount of traffic on the railways, and to the lack of horses. The military authorities, which

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at that time controlled all of the motor trucks in the country, were obliged to order a number of trucks for the express purpose of relieving the congestion at railroad stations, which were overcrowded with freight. Later on other trucks were needed for carrying agricultural produce to market and for supplying the war industries.

In 1917-18 the Government departments of railways, posts, war and food supplies induced the General Staff of the army to release a great number of motor truck columns for use in the home service. After demobilization, this military motor truck transport organization, which had been engaged only in non-military work, was converted into a civil organization and placed under the Treasury Department, to engage principally in freight haulage, with the object of relieving the railways. A second large motor traffic organization, in charge of the Postmaster-General, serves for passenger and mail transport, in the same manner. Of course, these services could not be kept running without an extensive system of repairshops throughout the entire country. Such repairshops exist at automotive factories and at automobile sales establishments, but the services can also invoke the help of machine shops doing repair work on agricultural machinery, bicycles, sewing machines, etc.

The advantages of such large motor transport organizations, with centralized control, are numerous. The operation of single or a few motor trucks by private owners generally does not prove a paying proposition, because there are too many difficulties to contend with. The private owner does not possess the necessary mechanical knowledge to select the right kind of truck; he cannot judge the qualifications of the drivers, and cannot give sufficient attention to the proper maintenance of the trucks, checking of operating costs, etc. Repairs are often entrusted to incompetents and prove very expensive. The need for them frequently arises at times when the trucks are urgently needed, and, furthermore, the truck often stands idle for a long period of time, owing to lack of work for it.

Such difficulties are avoided by large organizations. Some of the trucks, and particularly trucks designed for special purposes, are being hired out to small and large customers for shorter or longer periods. Other advantages are the uniformity of management, centralization of technical supervision and of material purchasing and storing, the maintenance of a fleet of reserve trucks to meet any extra demands and the execution of repairs in large, well-equipped repairshops.

In the following is given an outline of the two great German state enterprises for freight and passenger transport by motor vehicle.

A. Motor Freight Service

In 1917-18, 115 military motor truck columns were placed in the home service, under the control of the Treasury Department. Despite great difficulties, bad condition of the steel-tired vehicles; inability to secure good drivers, these being greatly needed at the front; lack of adequate repairshops for this particular work; great loss of time caused by repairs in outside shops and poor work done by same; poor grade of fuel available,

etc.), these columns have performed their work in a remarkable manner. They have been used principally for transporting agricultural produce such as potatoes, turnips, vegetables, grain, etc.; also to carry coal, wood, iron, fertilizer, piece goods, road material, etc., from the producer to the railroad freight station, or from the railroad freight station to the consumer; while again they have been used in large overland transports from warehouse to warehouse.

The performance of these truck columns is well illustrated by some particulars of the work done in October, 1918, the month before the revolution, and consequently the last month during which normal conditions reigned. During this month 302,000 tons of freight were carried an aggregate distance of 845,000 kilometers, the useful work done amounting to 3,157,000 ton-kilometers. The total distance traveled, both loaded and empty, amounted to 1,483,000 km., and the total consumption of fuel was 1,170,000 liters. This performance was not equalled after the revolution, owing to the continual outbreak of strikes, diminished fuel production, general aversion to work, and occupation of a considerable portion of the country by the Allies.

In March, 1919, there were 14 motor traffic offices in the larger towns, which controlled 107 motor truck columns, comprising 2,000 trucks and 17 emergency or repair road trains. The truck columns were distributed over 70 counties, with branches in villages or on larger estates. The number of office employees and workmen was about 3,000.

Up to the present the service has been a Government affair entirely, but it is to be gradually transformed into a number of

enterprises, of local character, in order to better accommodate the service to local conditions. The new enterprises are named "Kraftverkehrsgesellschaften" (motor traffic companies) and are incorporated. The capital of the company usually is raised in part by villages, townships, counties, etc., within the operating range of the company. The National Government assigns the stock of motor vehicles to the company, and in turn receives a portion of its share capital. The capital stock of these companies varies from 250,000 marks to 1,500,000 marks. At present there are 16 motor traffic companies operating 98 service departments. The operating territories, location of main offices and number of service departments are as follows:

Territory of company	Headquarters of company	Number of service departments
1. Ostpreussen	Koenigsberg	4
2. Pommern	Stettin	6
3. Nordmark	Hamburg	7
4. Schlesien	Breslau	7
5. Marken	Berlin	8
6. Lakwa Essen	Essen	10
7. Sachsen-Anhalt	Merseburg	5
8. Niedersachsen	Bremen	9
9. Hessen	Frankfort-on-the-Main	4
10. Rheinland	Cologne	8
11. Sachsen	Dresden	5
12. Thüringen	Weimar	1
13. Braunschweig	Brunswick	2
14. Wuerttemberg	Stuttgart	4
15. Baden	Karlsruhe	2
16. Bayern	Munich	16

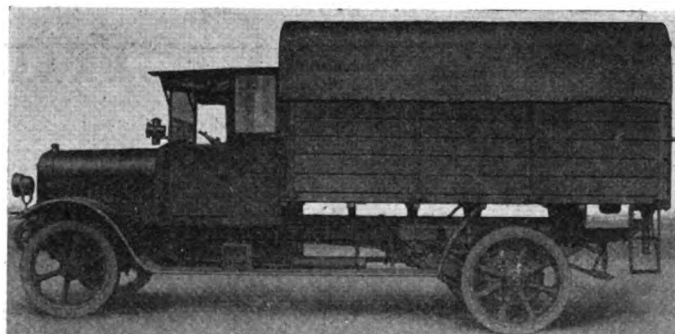


Fig. 1—Opel standard 5-ton truck extensively used by German motor traffic companies



Fig. 2—Types of passenger and mail carrying buses operated by German Post Office Department

At present the total number of office employees and workmen is about 3,000; the rolling stock comprises 2,871 motor trucks, 37 tractors, 1,079 trailers, 187 passenger cars, 126 motorcycles and more than 150 motor buses.

As above mentioned, all of the companies were established solely with public funds, the National Government participating to the extent of about 70,000,000 marks, of which about 7,750,000 marks is invested in the stocks of the companies and 63,000,000 marks is in the form of loans. Local governments have invested about 18,000,000 marks in these enterprises. The capital resources of the companies are to be augmented in the future by interesting further communities and by the National Government assigning further motor vehicles. Of course, these figures of capitalization are not a measure of the total property value, as at present motor vehicles sell at higher prices than at any time since the organization of the services, and, furthermore, equipment purchased in the course of service is not included in these valuations.

In order to improve the working economy of these enterprises, first of all the worn-out trucks were exchanged for new or overhauled ones, and then additional new trucks and trailers were obtained from the Government. As far as possible, the trucks were provided with rubber tires, stocks of spare parts were replenished, and the shops were newly equipped. Finally, competent men were placed in charge of the technical and business departments of these companies. In order to ensure that the income would keep pace with the increasing expenses of the companies, a considerable advance of the transport charges was necessary; the charges originally made, which were fixed by the military authorities, were very low (0.60 mark for the ton-kilometer) and the National Government was compelled to subsidize the enterprise.

A further increase in the charges was necessitated by the soaring of prices of all supplies needed and the considerable increase of salaries and wages. Native benzol rose to six times its peace-time price and foreign benzol to ten times that price. Rubber also had to be purchased at unprecedented prices owing to the depreciation of the mark. Strikes, temporary lack of fuel and the tying up of a large number of trucks in repair shops caused stoppages in the service; finally, the general economical and political situation had a very detrimental effect on the financial success of the enterprise.

Nevertheless, in one month about 70,000 tons of coal

and about 18,000 tons of victuals were transported, and in three months the total volume of freight carried was about 400,000 tons. The motor truck during this period did the work of more than 800 freight trains—not a mean performance in a period of chronic transportation difficulties. Among the materials carried were wood, coal, peat, stone, potatoes, building materials, machines, iron, cinders, gravel, clothes, household goods. Transport work was derived from the following sources: Agriculture, 17 per cent; industry, 49 per cent; municipalities, 26 per cent; army depots, 2 per cent; miscellaneous, 6 per cent.

The motor traffic companies also hire out their motor trucks or road trains with drivers, etc., to all interested parties for any desired length of time; the rentals are as follows: For the service of a motor truck in covering a maximum total distance of 50 kilometers in 8 hours, inclusive of the trips to the loading point and back to the garage, a charge of 325 marks is made; any longer service on the same day costs 40 marks per hour or fraction thereof. If a greater distance than 50 km. is to be covered (always including drive from and to garage), an extra charge of 6.50 marks per kilometer is made. A trailer costs 100 marks a day; a helper, 6 marks per hour; furthermore, in the case of trips extending over more than one day, maintenance charges of 24 marks per man and day are made. Fig. 1 shows a standard motor truck for freight transport, built by the Opel Works. This truck has a load capacity of five tons and can be used with one or two trailers.

The uses to which the motor truck lends itself are amazingly varied. In the first place, it serves for carrying goods from remote points to the railway terminals. This is a very important service, because in this way regions with little or no rail service are rendered accessible. As a consequence, the traffic on the railways is increased and a faster mail service is also insured. As is well known to all shipping men, the railroads cannot successfully compete with the motor truck in short distance freight haulage, say over distances of 12 to 25 miles; the high cost of transport to and from the terminals and of switching individual freight cars, especially in view of the very high wages now paid in Germany, makes this impossible. Furthermore, a large number of freight cars are thereby withdrawn from service in long distance freight haulage, their natural field, with the consequence of an increase in freight charges. Un-



Fig. 3— Vomag motor omnibus with trailer used by German Post Office Department where traffic is heavy

der these conditions the motor truck is the fastest and most economical means of short haul freight transport.

Agricultural production has been considerably increased by this means of transport; and the buying power of the farming population has consequently been increased, which means that there is a market among them for more machines and other industrial products. In many cases the motor truck obviates the need for building railways. This is very important, as, on account of the immense costs, the state cannot afford to build any new railways at present. Numerous freight cars are released for other more pressing needs by the use of motor trucks in hauling coal from the mines to nearby industrial and electrical works.

In spite of all the unfavorable influences, the periodical reports of the motor traffic companies show that with one or two exceptions they are earning money and paying dividends. This warrants the expectation that with the dawn of better times, the prosperity of these companies is assured. As time goes on it will no doubt be possible to reduce the charges for service and it is, moreover, expected to effect a considerable economy in operation by using 5-ton trucks with trailers instead of the 3-ton trucks mostly used to-day.

B. Passenger and Mail Services.

The motor traffic companies mentioned above have also taken up passenger transport, and at present over 150 motor buses run on about 50 lines of an aggregate length of about 1600 km. But a combination of freight and passenger service does not seem to work out very well, because of the different working conditions. Therefore, in the future passenger services will probably be conducted exclusively by the Post Office Department, which will also carry the mails, parcels, etc. Certainly the post office is better equipped to handle this service than the motor traffic companies; carrying mails (letters, parcels, etc.) alone is too expensive, consequently it is advantageous to carry passengers on the mail lines, just the same as in the old mail coaches of 75 years ago.

The first motor mail line was established in 1906, but it did not show the anticipated success and shortly before the war there were only 47 governmental motor buses in service on mail lines. However, the number of private motor bus lines carrying the mails was considerably greater. In 1914 there were 101 government-owned four-wheel motor cars in service transferring and collecting mails in the cities, most of them of the electric type.

There were also 124 small three-wheeled electric cars in this service.

The German Post Office Department has under consideration the following plans:

1. To establish motor car mail and passenger lines in the country.
2. To develop and extend the city motor car services.
3. To establish motor car columns for telegraph and telephone construction and maintenance.

The government traffic companies, above mentioned, have been ordered not to establish passenger lines, except upon an agreement with the Post Office Department. Experience with mail and passenger lines in the post office services has been that they can be made profitable only if fleets of at least five vehicles are used and the total distance covered amounts to at least 200 kilometers per day. To increase the receipts in districts with a heavy tourists' traffic, special summer lines may be provided. Garages at the terminals, properly heated and lighted, are generally to be furnished by the communities interested. The network of country motor mail services is to comprise about 100 lines with a total of 3000 kilometers and employing 260 motor buses to begin with. Fig. 2 shows some of these mail buses, built by the Magirus Co. of Ulm. They have 12 to 20 seats. The fare is 0.50 mark per passenger per kilometer, 0.05 mark being charged for each piece of baggage (up to 30 kilograms) per kilometer. The seats are comfortably upholstered; lighting, both interior and exterior, is by a generator and battery system, and heating by the exhaust gases. On some lines with heavy passenger traffic motor buses with trailers are used. An example of these combinations is shown in Fig. 3, these vehicles being built by the Vomag at Plauen.

Passenger car services in the large cities are capable of much greater development, and a first instalment of 400 to 500 vehicles is provided for; they are mostly chassis of 1 to 2 tons capacity. These services are to comprise not less than five motor buses each and will carry passengers and the mails from and to railway stations.

For the transport of materials for telegraph and telephone construction, use will be made of 160 to 200 trucks of 3 to 4 tons capacity. All these truck types are standardized, so that the production is cheapened and repairs and replacement of parts are facilitated. Repairs, overhauling, etc., are effected at the system's own centrally located shops, with branches in the smaller towns.

The Winter Top Improves Appearance and Utility of Car

Has advantage of lighter weight and lower cost as compared to closed car and is readily applicable to ordinary runabout or touring body. Both glass and celluloid lights are used with some parts usually permanent and others removable. The popularity of this top is increasing.

By George J. Mercer

WINTER tops on standard open bodies are becoming more common on cars produced in quantity. The idea is not new, but the results are more satisfactory now than formerly. The Franklin features a top of this description on their runabout, as shown in the accompanying illustration.

It is claimed that with this top the car combines the flexibility of the runabout with the comfort of the enclosed body, without the weight of the latter. It is especially applicable for business or professional use.

The material used for covering is Fabrikoid. The top is a permanent structure and is not intended to be lowered. The triangular glass sections at the forward end are part of the windshield and can be used as wings when the window panels are removed in warm weather. The interior of the top is lined with duck, a material that makes for warmth when the top is enclosed and at the same time will not hold the dust when top is used without the side windows. The latter may be removed for summer use and regular storm curtains carried in the pocket at the rear of the seat for emergency use. The height of seat from floor is 13 in. and the head room from top of cushion to under roof is 39 in. The luggage pocket at rear of seat is 7½ in. wide by 38 in. long by 14 in. deep.

The Cole Co. is featuring two models with permanent tops, the "All Season Sportster," seating five passengers, and the "All Season Tourster," seating seven passengers, one illustration of which is shown herewith.

This is a good example of the up-to-date method of enclosing the open car without losing the advantages of the clear open side when required. At the same time the addition of this form of top gives ample protection and comfort during cold and inclement weather, while the saving of weight over a closed body is considerable.

As this top is not collapsible, the supports can be made strong, yet the large plate glass windows at the side and rear afford ample vision. The side glass is 28 in. long and the rear is 24 in. by 12 in. The width of the doors, front and rear, are 27½ in. over the moldings and there are inside and outside handles. All side curtains are made with celluloid lights and can be instantly attached. When not in use they are carried in the roof and are invisible.

The interior of the top is equipped with dome and reading lamps, and flexible robe rail and footrests are used.

The windshield is three-piece and has a slant of 18 deg.

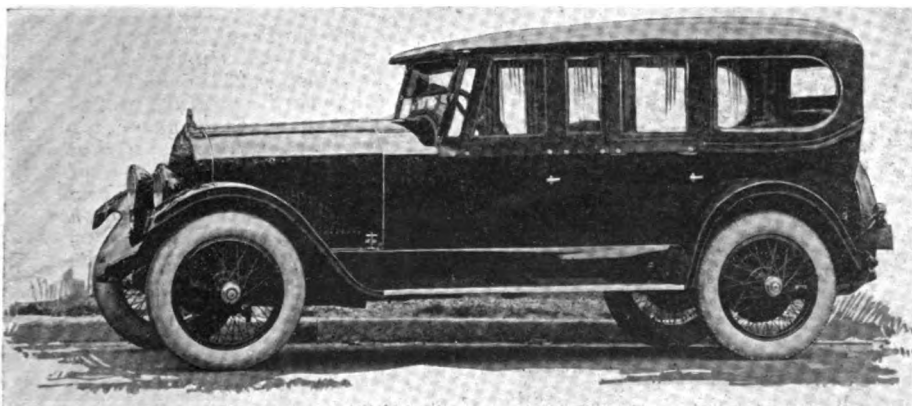


Franklin runabout equipped with winter top

The fabric cover material is colored to harmonize with the body colors, aluminum reinforcement being used to form the rounded corners over which the fabric is stretched. The interior of the top is trimmed with broadcloth and silk roller curtains are fitted to the glass windows of the rear, side and back. The interior lights automatically switch on when the doors are opened.

The roof section covering the rear part that ends at the forward line of the rear side glass window is permanently attached. All forward of this line up to the windshield is removable. The desirable features of the open car are thereby retained and but little work is required to remove or replace the movable portion.

This type of top, which may be considered as an evolution of the so-called California top, is pleasing in appearance and possesses all the advantages that are to be had with the ordinary closed body.



Winter top as applied to Cole touring car

American and British Bodywork at Olympia Compared

A frank criticism of American practice from British standpoint. American bodies said to lack finish and comfort as compared to British product selling in England at same price. Sombre colors and excessive fender clearance not liked. British cars generally have lower seats but thicker cushions tilted toward rear and greater freeboard. Wood or aluminum instrument boards used. Show tendency to shape cowl to give horizontal line at windshield. Adjustable front seats are provided.

By M. W. Bourdon

BRITISH designers may have a lot to learn from Americans concerning economy in chassis production, but the boot appears to be on the other foot when excellence and comfort of bodywork is in question, and it is time American body makers adopted better standards in both respects in their medium-priced cars if they wish to increase or even retain their hold on the British market. That is the conclusion arrived at by the writer after careful comparisons between the American and British bodies at the London Show. It is confirmed by discussions with prospective buyers and other disinterested individuals.

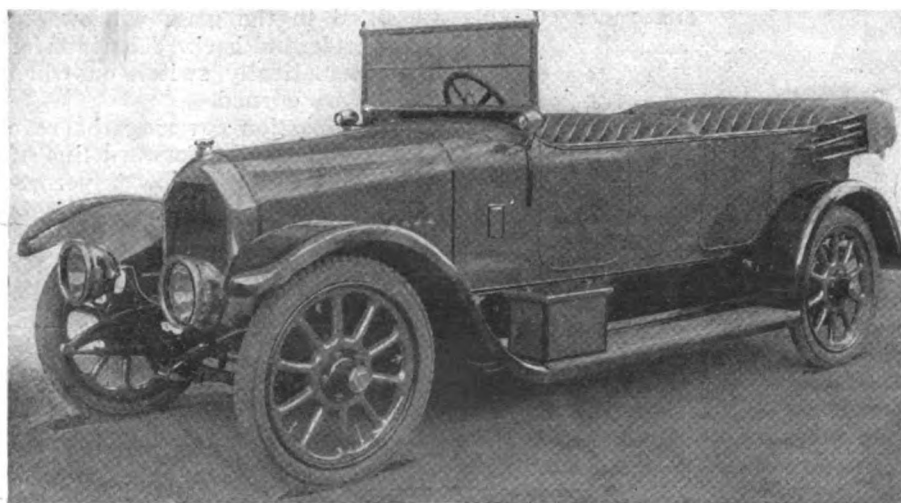
To be quite frank, the American body as known in England is frequently quite unattractive to the British eye, and it does not approach British ideas as to comfort. While present, the faults are somewhat intangible and difficult to define.

In the first place, there is the matter of outline, and here it must be admitted that no great fault can be found with quite a goodly proportion of American cars, their only handicap being their somewhat "lanky" appearance owing to the greater height of their chassis frames from the ground. But this is not a very weighty objection, for it is realized that a generous ground clearance is frequently of advantage, even where good roads are the rule and ruts more than two or three inches deep are exceptional. Never-

theless, the overall height of American cars appears frequently to be greater than is necessary to obtain a specified ground clearance, and there seems to be no reason why 10 in. or 12 in. clearance should not be provided without making the top line of the body 5 in. or so higher than that of British cars with 8 to 10 in. clearance.

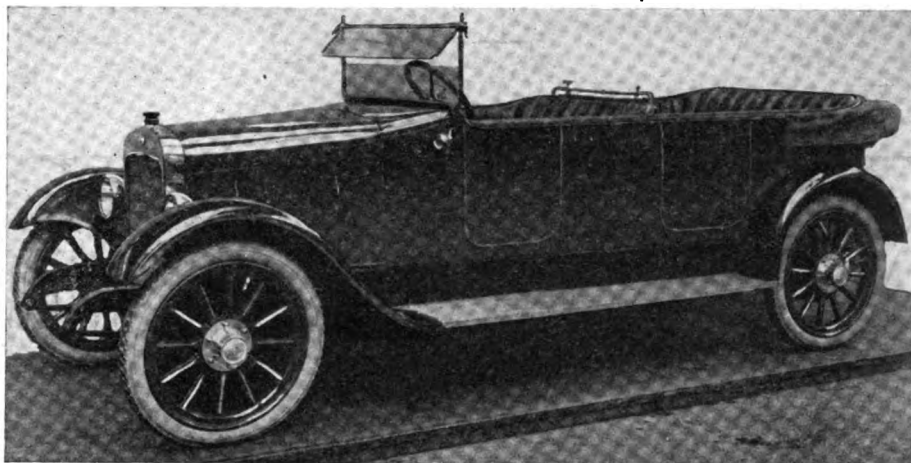
It would appear that American manufacturers deem it necessary to allow very much more clearance between the rear tire and fender than is needed to comply with British requirements. The reason, one assumes, is a desire to prevent contact between the two under peculiarly adverse conditions, while affording a comfortable suspension by the use of flexible springs. But a 10-in. gap between top of tire and top sweep of fender is not pleasing to the eye, especially when, as is generally the case, there is considerably less clearance at the front, and sometimes at the back, of the wheel. If the effects of exceptional road shocks must be provided for, it would seem better to limit spring deflection by buffer springs or rubber blocks, so that the sweep of the rear fenders could more closely approximate to the curve of the wheels. Not infrequently one observed American cars at the London Show with the tire only 4 in. from the fender at the front and 10 in. from it at the top; the British aim is to equalize these dimensions as closely as possible.

Then, in quite a number of American bodies there ap-



British five-seater of the popular design, the 15.9-hp. Humber. Central side panel is 23 in. high and has total inward curvature of 2½ in. below a point 6 in. under top line; ½ in. incurve above that point. Note increased curve of front door to merge into cowl and absence of pronounced line through hood. Blemishes are the heavy bottom frame of windshield and its black irons, the black lining at junction of hood and cowl, foot-boards too low (only 10 in. ground clearance) and the battery box on step

Phoenix 18-hp. five-seater of somewhat imperfect lines, giving box-like appearance; effect would have been improved by slightly curved side panels in conjunction with a rounded front edge to the radiator. Back of rear seat has harsh appearance, intensified by low level of folded top. Car in reality looks better than in photograph



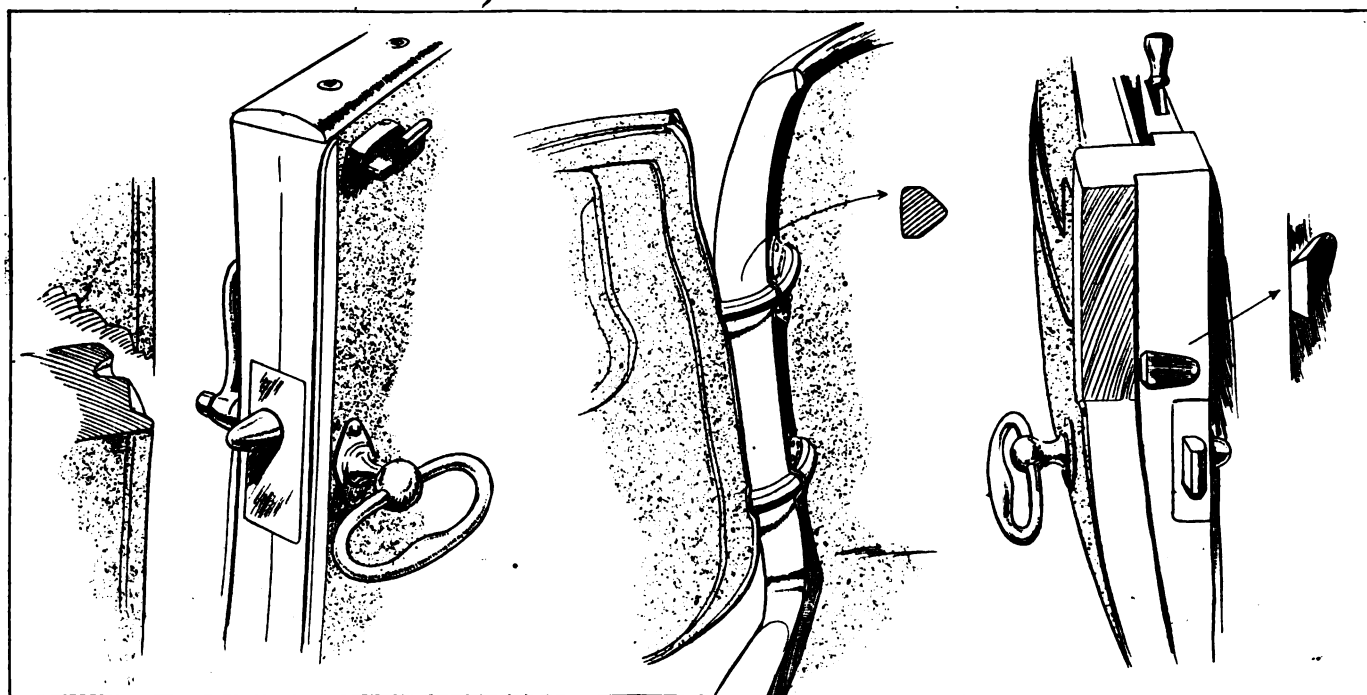
pears to be too pronounced an endeavor to provide a straight-line effect. But it would be unjust to lay this charge generally, for, excepting their height from the ground, the clumsiness of their windshields and their excessive fender clearance, there were American bodies at the show which in symmetry of outline and general appearance (from a distance) were quite in accord with British ideas. A straining after effect, as, for instance, in carrying from radiator to back of car a straight band some 2-2½ in. wide, painted white or other distinctive shade, is noticed in some cases.

Generally speaking, the British idea of symmetrical and "clean" outline is one in which no one feature or part holds the eye. There should be no striking curves. No "forced" straight lines; where the latter occur they should be subdued of themselves and merge without sudden break into other forms. The difference at one part or another may be intangible, but it is very real, nevertheless. One needs almost the eye of an artist to lay a finger on a point of curvature or design that offends the eye; but even an artist with fifteen years' automobile experience failed to

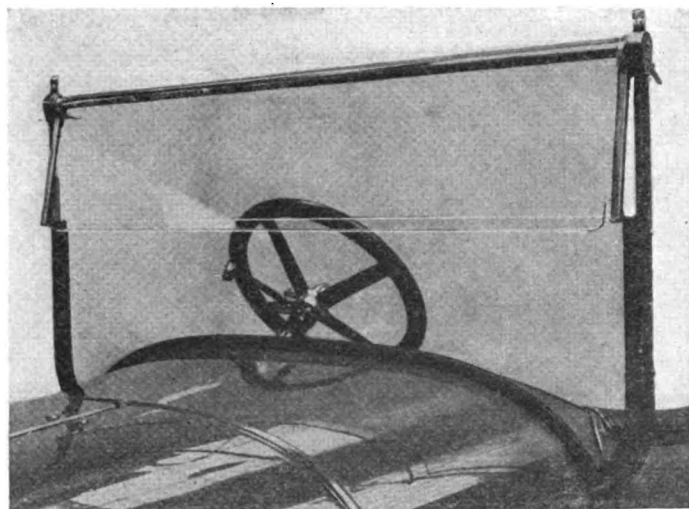
give the writer a precise indication concerning his views of the faults of one such car.

The question of outline may often be connected with that of cost. A taper or curve at one point may involve hand forming the panel in place of rolling it; but that is where the British body builder will not, as a rule, allow cost to prevail; to arrive at the desired effect he does not hesitate to sacrifice economical production—within reason, of course, on standard jobs. Or the attainment of symmetry of outline may and often does necessitate a more elaborate and costly framing to support it, one in which a fair amount of hand planing is needed.

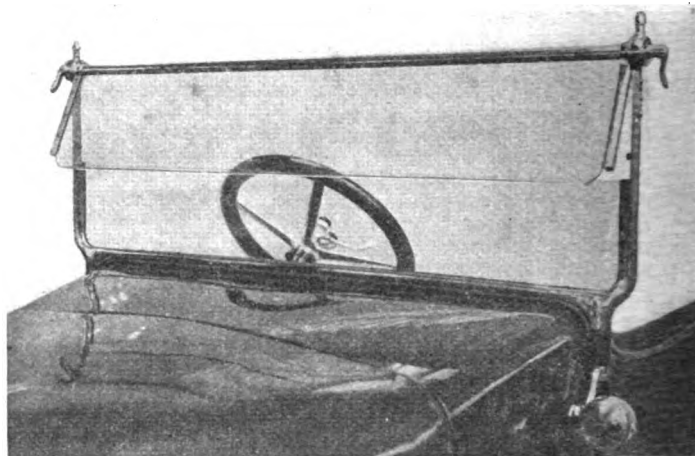
The "tubular" type of body—one with a pronounced rotund appearance in end elevation—is not favored by more than one or two British makers (Angus Sanders is one of the exceptions), but a slightly curved side panel is of great advantage. A good example in the latter respect has a total curvature of 3 in. at the center panel, but the extreme point of the "bulge" is only some 6 in. below the top edge; from this point to the bottom the panel curves inward 2½ in., so that the incurve of the upper



To the left—Conical door latch used on Standard cars with safety catch shown in section. Cone is spring backed and does not reach limit of travel before bedding home in pillar hole, thus is able to adapt itself to spreading of body frame. Center—Peculiar type of door hinge used on F. N. cars. To the right—Double dovetail block on door engaging with corresponding slot on doorpost used by many British body makers to prevent rattle due to "spreading" and distortion of framework



Unusual design of windshield on Belsize car



Typical British design of windshield

6 in. is but $\frac{1}{2}$ in. The overall height of the panel is 23 in.

No hard and fast rule can be laid down as to the best curvature of panels generally or as to any other point of body design, for the foundation of the whole outline is the radiator. A body which may be pleasing from any aspect with one radiator may with another appear unsightly.

Turning from outlines, it may be said that the average British buyer does not view with approval the somber (usually black) colorings of American cars and the absence of a few brass or plated details. He only just tolerates the black leatherette top which British makers in isolated cases adopt in lieu of khaki or other neutral tint of mohair. He does not object to black lamps against a light body coloring, but these and other fittings finished in that way appear to have a distinctly funereal effect against black or dark bodywork.

But one can excuse departures from British ideas in respect of coloring and lack of relief. Where the English buyer finds most fault is in finish and comfort, or rather the lack of both. He will put up with a somewhat rough exterior finish in mechanical details if they are hidden from view by hood or floor-boards, so long as the chassis is reliable in operation. But he does not like having almost to apologize for the bad fit and rough finish of doors, hoods and bodywork details every time he finds a friend or acquaintance looking at his car. And yet he instinc-

tively feels ashamed of its shortcomings and called upon to make some such remark as "Of course, they could be better, but then they don't affect the running of the car." He would much rather spend another ten per cent on the price of the car and have a finish which would call for no apology but would rather give cause for pride.

For the British user—taken in the lump—likes to have reason to feel proud of his car, and he abhors shoddy workmanship, trumpery fittings and shabby appearance in it, almost as much as he dislikes living in a dilapidated jerry-built house.

Perhaps the cars shown at the London exhibition do not represent a fair sample of American bodywork, even though there were approximately thirty different makes on view, for there certainly were a few exceptions to the general rule. Nevertheless, the criticisms relate to many offered at \$4,000 and more. It is no good excuse to point to larger engines, six cylinders and so on. The Britisher would prefer to have half an inch off the bore or a couple of cylinders less if he could have the value put into workmanship and exterior finish.

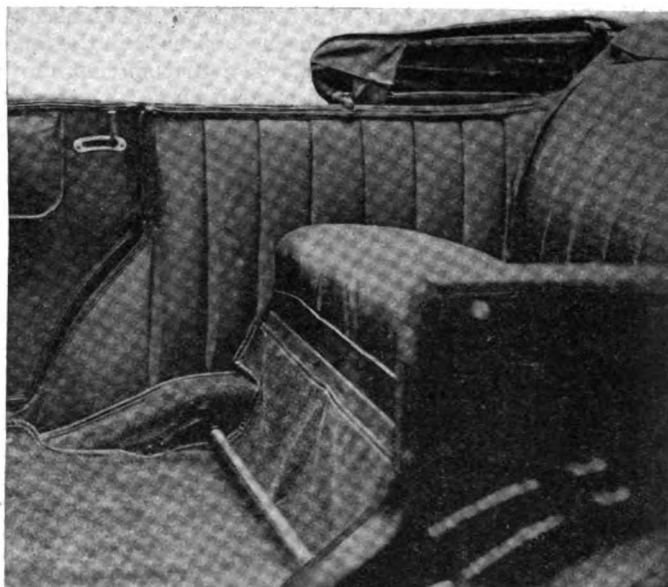
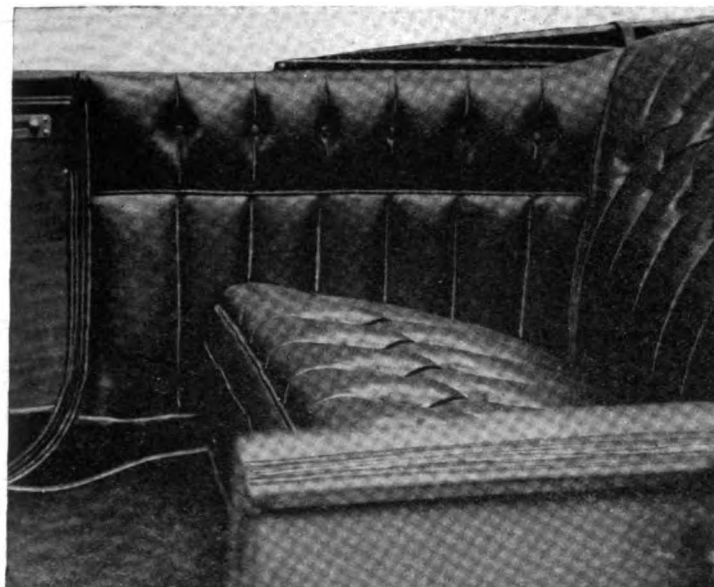
To be specific. The majority of the open-bodied American cars examined at the show had doors which never approached a fit in their openings; there were aching voids up to $\frac{3}{8}$ in. in width. Then, the door pillar fittings—latch hole, dovetail groove, and stop—were as often as not formed as a unit consisting of a roughly made, poorly



Comfort and protection in British bodywork. Note height of sides in relation to passengers' shoulders and compare with companion view of American car sold at approximately same price in England



Sitting ON the car, not IN it. Passengers in American car exposed to elements in bolt upright position because of the shape of upholstery and the high seat. Compare with companion picture



Rear seats of British and American cars compared. The American car (on right) sells in England for nearly \$4,000. Note depth and angle of seats, height of freeboard, etc.

finished and badly fitted steel pressing, not neatly sunk into the pillar but projecting and boldly exhibiting its nakedness. The provision for preventing "chattering" and noise arising from the "spreading" of the body by fore and aft frame distortion was casual to say the least. The door handles and handle groove plates were as roughly finished as though they had just left the foundry or the press and only the hinges came up to British ideas of durability.

Windshields were distinctly cumbersome and crude in outline and had the word "cheap" written all over them. They may be inclined at a jaunty or even useful angle, but their roughly finished fittings must catch the owner's eye every time he glances forward. They may be effective, but they will not bear close examination of their workmanship.

One could continue in this strain almost indefinitely, and the way in which the hood merely "fits where it touches," the roughly finished ends of timber exposed to full view with a dab of black paint intended to cover the raw ends of the grain are among other details with which fault could be found.

It may be truly said that improvement in such matters would add to the cost. But \$150 would go a long way and make the car as a whole appear almost high-grade instead of mediocre or worse. The man in England who buys a six-cylinder or four-cylinder car of 15 to 30 hp. is usually a man of some financial and social standing, and he does not appreciate excellence of performance unless it is accompanied by a presentable appearance. The type of buyer who will put up with poor finish and bad workmanship in bodywork is not after a fair-sized car; in fact, in every type of car buyers want the total cost well proportioned between chassis and bodywork. If they can't have 15 hp. with a presentable body, they will take 12 hp. with an external appearance that will give rise to pride of possession.

It must not be assumed from the foregoing that the writer suggests that all British bodywork is ideal. That is not the case; far from it. But there is apparent a more genuine effort to maintain a good balance between quality in chassis and body. Excellence in those features conducive to smoothness of running is generally accompanied by similar excellence in bodywork. In fact, one might well apply the proverb "A man is judged by the company he keeps" to British chassis and bodies. But apparently American car manufacturers will expend great efforts in

attaining excellence in chassis features with economy in production, only to fit the products of the engineering side of their plants with a superstructure suggesting nothing but a cheap car made by inferior workmen to a crude design.

Perhaps the mentality of American users differs from that of the British; but this is written from the standpoint of the latter for what it is worth. Nevertheless, whether the American user troubles about "finish and fit" of body work or not, he is built like an Englishman and therefore one may surely assume that the ideas of both as to comfort coincide. If that be so, then the American is not, any more than is the British buyer of American cars, being offered a reasonable standard of excellence in this respect.

American bodies are certainly far from comfortable in the estimation of British users. In the first place, one often hears it said that passengers feel they are sitting *on* the car, not *in* it as they do in a home production of normal dimensions. The actual differences between British and American bodies in height of seat; thickness, width and angle of cushion; height and angle of back; and height of body sides may not be great, but they are quite sufficient in the aggregate to make all the difference in comfort.

The following table gives comparative average dimensions of the rear seat, etc., of eight British and eight American bodies of standard design and similar sizes at the London Show; in specially built British bodies, the comfort and protection afforded to passengers is further increased by greater divergencies from American standards as exemplified by the bodies examined:

	Height of uncompressed cushion from floor	Top of cushion to top edge of body	Floor to top edge of body	Effective width of cushion front to back	Depth of 1 cushion 2-in. back of front face
British	in. 12	in. 11	in. 23(a)	in. 21½	in. 9
American	13	8	21(a)	19	7½

(a) Difference increased appreciably in effect by the greater compression from passenger weight of British cushion springs.

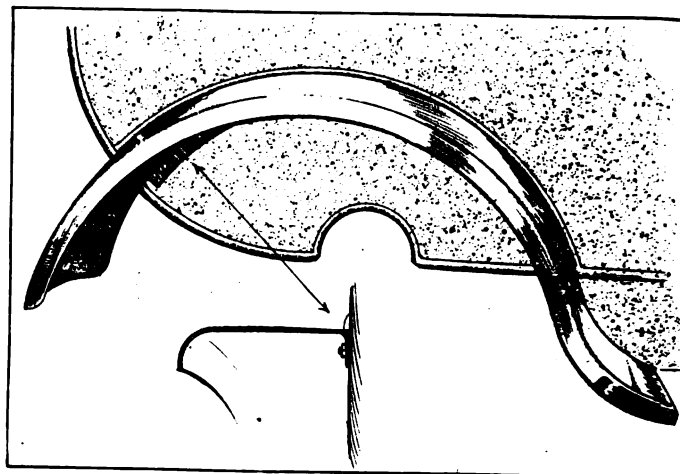
The differences brought out by the above table show that the average British car has (1) cushions slightly lower at the front edge, (2) appreciably greater "freeboard," i.e. height of top edge of body above cushion, (3) higher body

sides, (4) wider cushions and (5) thicker cushions. But where still greater comfort difference arises is in the angles of cushion and back upholstery. The British cushion has regularly graded springs which make it on an average 4 in. higher at the front than at the back, whereas the American cushion is almost flat or, worse still, higher at the center than 2 in. behind the front face. The British back upholstery has similarly graded springs, making it "proud" at the waist line and receding at the shoulder height. In brief, a less upright position is afforded in the British design and the continuous backward slope of the cushion plus the more flexible springs increases the apparent freeboard. As a result the passengers are approximately 6 in. deeper in the body and experience not only greater comfort, but more protection as well. Compared with British bodywork that on American cars has been described as "cold," as well as uncomfortable, and the foregoing accounts for this.

Then, too, few British cars of even medium grade have other than leather for the upholstery, though in the less expensive types the covering may be quite thin leather and even imitation. But, leaving the question of material out of account, most British makers favor buttoned upholstery in place of pleated; it is claimed, and apparently with good reason, that buttoning increases comfort, not only because it tends to prevent the passengers from slipping forward or sideways on the seat; but also by adapting itself more readily to the anatomy of the individual. Admittedly, straight pleated upholstery can be quite satisfactory; but it rarely is so. It may be said here that none but the cheapest of British upholstery has other than horse-hair stuffing; fiber and other substitutes are taboo, and the padding is as liberal in quantity as in thickness, the latter varying from 2 to 4 in.

There appears to be very little difference between British and American methods and materials in body framework. For the main members and runners either English or American ash is used; American whitewood for the lining and boards of the less expensive bodies, cyprus for the better ones. Aluminum is rarely used for panels, lead coated steel sheet being preferred even in bodywork of the best quality. Panels are rolled, and welded at joints in stock jobs.

There is no standard as regards the finish at the top of the sides; as often as not the upholstery is carried unobtrusively (not with the bolster-like effect at one time favored) over to the outside edge and finished off with a metal beading, one alternative being a strip of mahogany

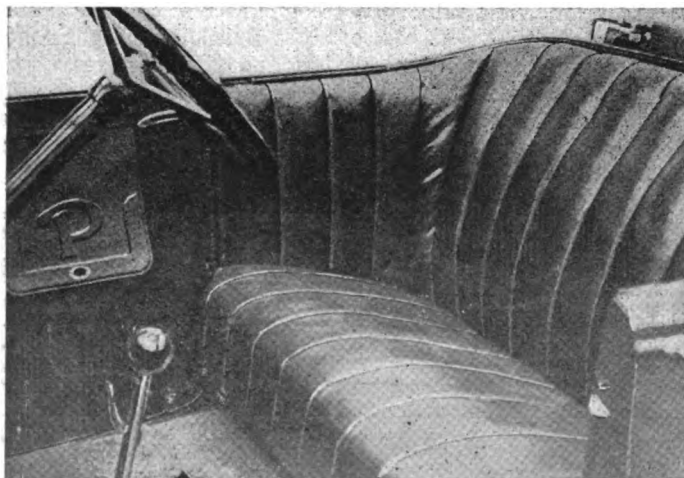


In isolated cases, British makers endeavor to eliminate fender stays by fastening an inner lip to the body side as indicated above

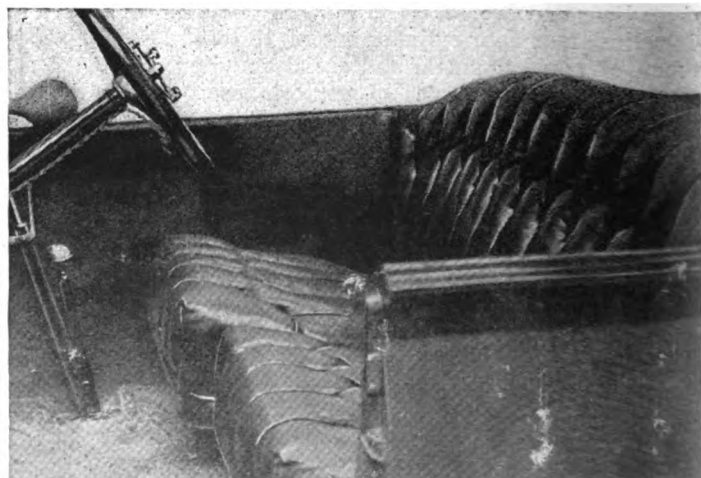
along the top and another a continuation inward of the side paneling. Projecting door hinges are used quite as often as the concealed type.

On British cars instrument boards of aluminum, but of less elaborate design and with fewer fittings than those of the "super grade" cars, are becoming quite normal, even in small and comparatively low priced chassis. But a mahogany or walnut board is still more general, and, when the fuel tank is relegated to the back of the car by the use of vacuum feed, cupboards or drawers under the scuttle for small parcels, gloves, etc., are often provided. Flush fitting instruments with plated or brass edgings are normal, but no endeavor has been made to adopt the pressed sheet board of American practice.

The fixed standard two-panel windshield is rapidly displacing the single panel hinged pattern at one time so popular. Both panels are sometimes adjustable, but more often the bottom one is a fixture, arranged vertically with the upper one overlapping it when it also is vertical. No attempt has been made to follow the American type of curved corners of the glass frame; the latter in British cars usually consists of two vertical tubes surmounted by a stud or socket for securing the front edge of the folding top; the upper panel pivots at its top corners and has a tubular top rail and rectangular channel sides for holding the glass. Rubber strips to form an overlap for the



One of the few examples of pleated (as opposed to buttoned) upholstery in British cars; the 18-hp. Phoenix. Note angle of back and cushion, depth of latter 10 in. and height of body side (23 in.)



Driver's seat of 12-hp. Rover is 2 in. deeper than that of his companion. Allows easier exit and entrance by left side door and additional comfort in the one case. Fibre mat is standard

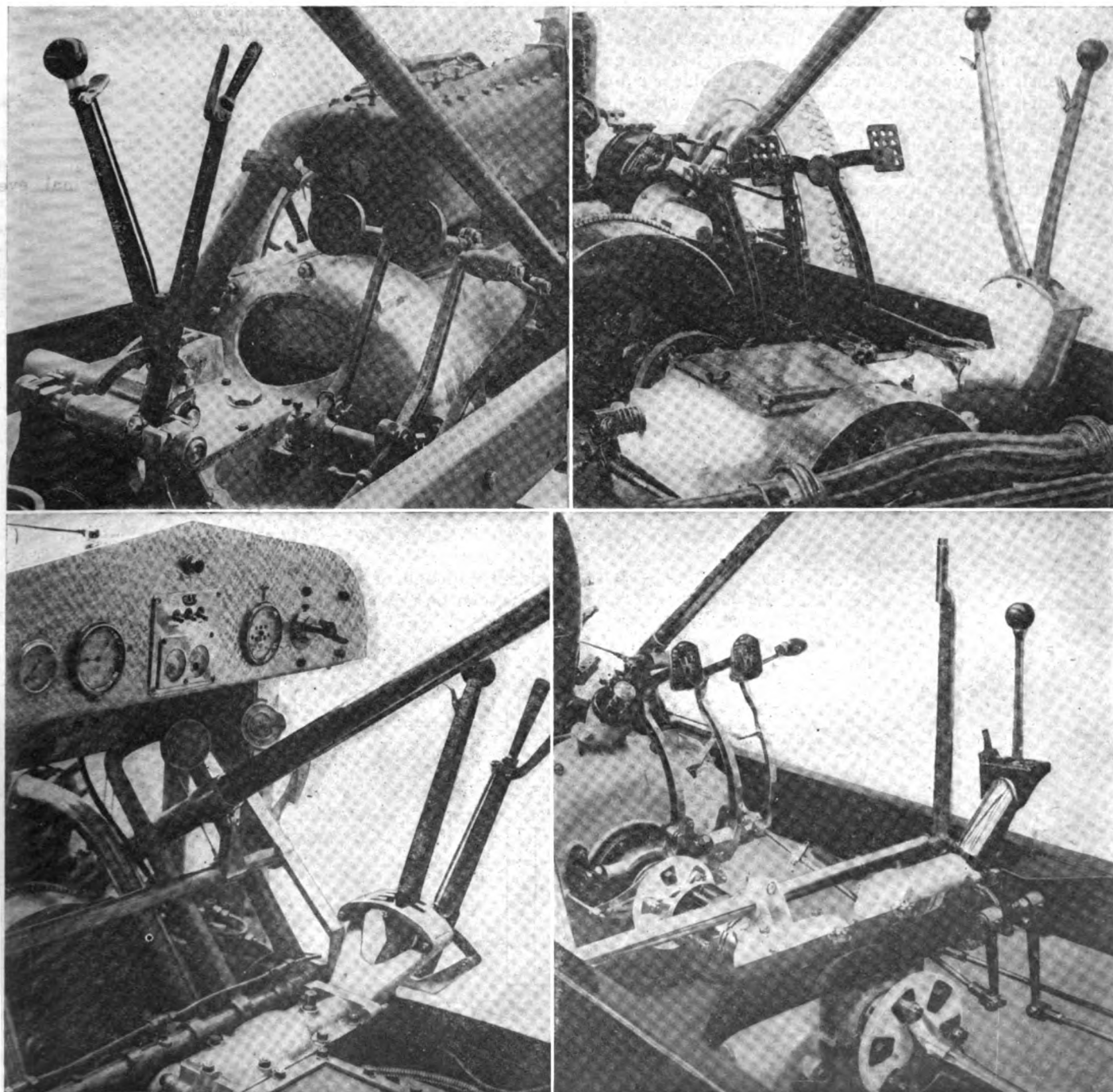
panels are not used, the close fit of the two or their overlap being considered sufficiently effective, and neater. When the cowl is crowned a mahogany strip is generally used between the cowl and the lower panel, without rubber packing, the glass frames being rectangular. But there is a distinct tendency to shape the cowl so that it has a horizontal or almost flat rear edge to avoid the need for a filling strip between it and the windshield. But it is very difficult to make a cowl of this pattern merge with an easy sweep into the body sides.

To exclude draughts a three-fold strip of fabric is often secured between the top edge of the windshield and the front stick of the folding top.

Front seats are frequently adjustable fore and aft even

in open bodies. Austin has this provision with the two seats formed as a unit secured in position by a peg extending down into sockets and operated by a hand lever projecting forward between the two occupants. The new Standard has separate adjustable front seats with a T headed locking screw passing through a slot in the base-board and screwing into one or the other of two threaded sockets in the floor, the screw head being accessible through a hand hole in the cushion board. In this case the backs are hinged to provide more space for entering the rear compartment and are formed of metal frames with a laced fabric band around them and a padded squab which is suspended from top of frame by an inverted pocket at the rear. There are no springs in the back.

Control Systems Used on British Cars at Olympia



Upper left—Austin. Upper right—Humber. Lower left—Guy. Lower right—Wolseley

Floatless Carbureters Coming Into Use in Germany

The kind and quality of fuel available for automotive vehicles in Germany during and after the war has caused most attention to be given to the carburetor and its problems. This article discusses the developments in that country and the conclusions of motor users.

By Benno R. Dierfeld*

UNDoubtedly the float with its actuating mechanism is one of the most delicate parts of the conventional type of carburetor. The soldered float, built up of very light brass stampings, is not sufficiently rugged to withstand the oft repeated "tickling"—resorted to by the driver in order to facilitate starting of the engine—and becomes leaky. The cork float, on the other hand, which is generally used only on the cheaper makes of car and is practically unknown in Germany, has a tendency to become soaked with fuel.

Both types of float possess the disadvantage that they will tilt and stick on heavy gradients or in consequence of road shocks, whereby the flow of fuel through the nozzle is disturbed. If the float chamber is located at the side of the mixing chamber, as is usually the case, any strong inclination of the carburetor will result in a

*Mr. Dierfeld is rated as one of the leading German writers on automotive topics and much of his work is familiar to readers of **AUTOMOTIVE INDUSTRIES**.

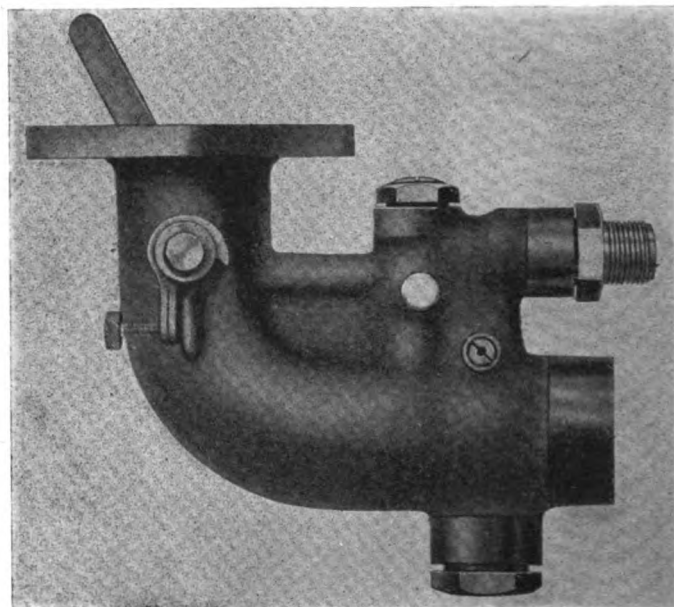


Fig. 2—Tuto carburetor

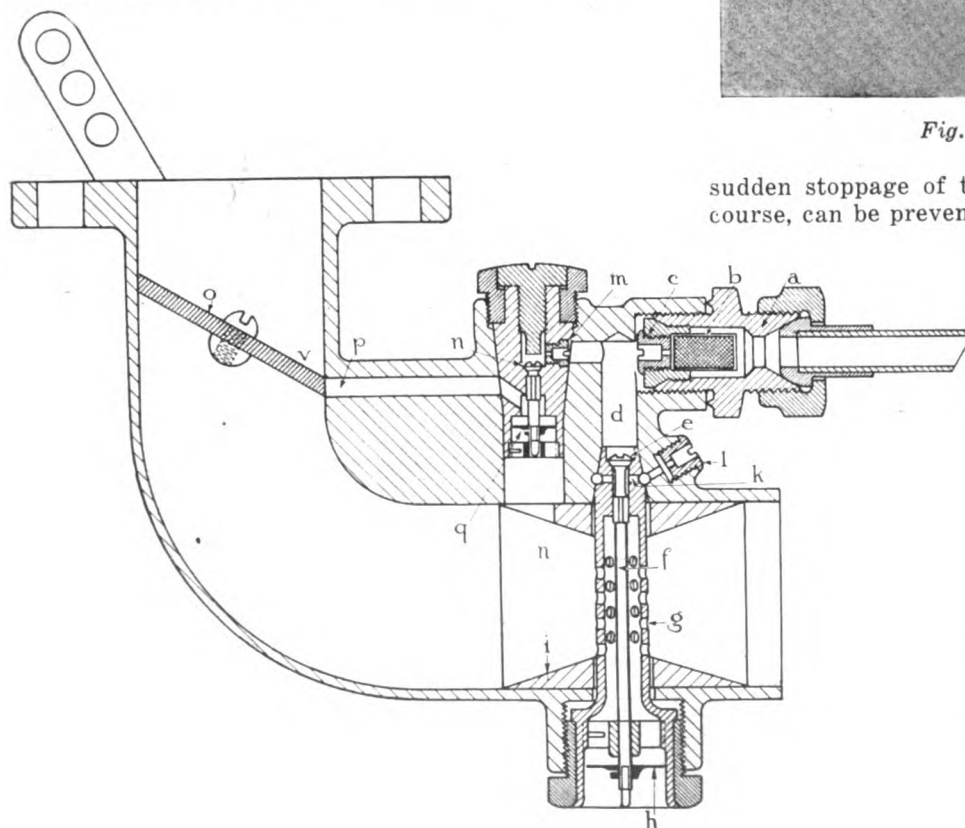
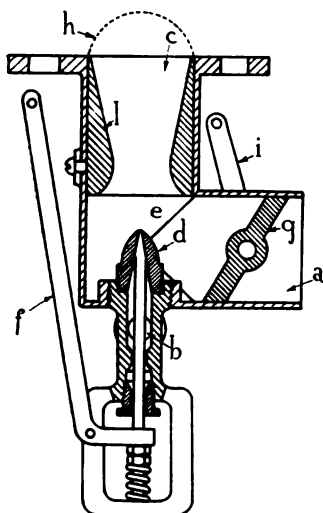
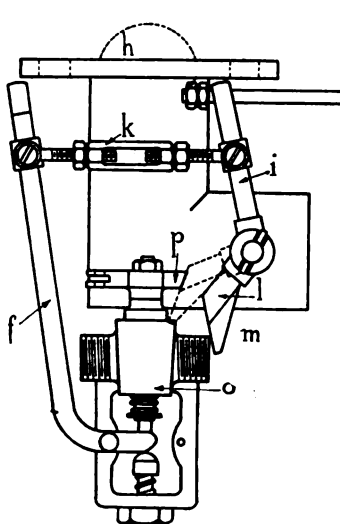


Fig. 1—Section through Tuto carburetor

sudden stoppage of the fuel delivery. This trouble, of course, can be prevented by arranging the float chamber and mixing chamber concentrically, but this construction is expensive, and the fuel nozzle and other delicate parts are thereby rendered less accessible.

Last, but not least of the disadvantages of the float are that the float valve must be adjusted whenever a change is to be made in the kind of fuel used, and the fuel supply in the float chamber is a constant source of danger, for when the engine fires back through the carburetor, this fuel may be ignited, and numerous car fires can be traced to this cause.

These disadvantages are eliminated in the floatless carburetor, which, moreover, is more compact and lighter than the conventional type and gives uniform results both on automobiles and airplanes, irrespective of the inclination of the machine. In air-

Fig. 3—Section through
Drego carbureterFig. 4—Drego change-
over mechanism

plane work such carbureters are required when looping is to be attempted, while for automobile work the floatless carbureter is most advantageous for driving in very hilly country.

The general principles of the floatless carbureter are not unknown to readers of *AUTOMOTIVE INDUSTRIES*, for in the article on the Maybach aircraft engine, in the issue of Nov. 14, 1918, there appeared a detailed description of the Maybach floatless carbureter, which has thoroughly proven its practicability on numerous German airships and airplanes. This carbureter, however, is of rather complicated design and is seldom used in automobile work. At present there are a number of simpler and most promising designs of floatless carbureters on the German market which are suitable for automobile as well as for airplane service.

Floatless Carbureters Extensively Used

The Tuto carbureter was extensively used during the war and apparently with good success, for according to the manufacturer no less than 16,000 of these carbureters were sold in a single month. Fig. 1 shows a sectional view of this device. The fuel enters at A, passes through the strainer B, and on through the interchangeable main nozzle C, filling the space D above the fuel shut-off valve E, which has a conical seat. The stem F of this valve extends through the perforated main nozzle tube G and carries disk H at its lower end.

During the suction stroke of the engine there is a strong vacuum in the venturi tube I, which is communicated through the perforations of the main nozzle tube G to the disk H. As a result of the suction on disk H, valve E is lifted from its seat, and fuel is then drawn into the main nozzle tube G. A correcting stream of air enters through the openings K, and the amount of this air is regulated by means of the interchangeable correcting air nozzle L. The correcting air atomizes the fuel and the mixture of fuel and air in the main nozzle tube G is more thoroughly broken up by the main air stream which passes through the venturi tube I at high velocity.

In case the engine stalls or is stopped by means of the ignition switch, the vacuum in venturi tube I ceases and the disk H no longer being under the influence of suction, valve E closes under the action of gravity and no more gasoline can flow into the carbureter. In case of a back fire through the carbureter, the pressure developed in venturi tube I forces down disk H and therefore automatically shuts the fuel valve E, whereby fire in the carbureter is prevented. In order to facilitate starting

of the engine, a special idling device is provided, which operates on the same principle as the main nozzle. The fuel flows through the pilot nozzle M, to the pilot valve N. If throttle valve I is nearly closed, when the engine is being cranked a very strong vacuum is formed in the idling channel P, in consequence of which disk Q is lifted and valve N opened. The air necessary for forming a combustible mixture enters around the outside of the disk and mixes with the incoming fuel around the stem of valve N, producing a rich mixture, which is favorable to easy starting. If throttle valve O is opened farther, the vacuum in the vicinity of the valve at V will decrease and at the same time the vacuum in the venturi tube I at U will increase. As a result of this change in pressures, the suction on disk Q of the pilot valve N is reduced and the latter closes. Thus the idling device is automatically put out of action as soon as the main nozzle begins to operate.

Details of Floatless Types

In Fig. 2 is shown an outside view of this carbureter, which brings out its compact form. On some engines the type illustrated cannot be used, on account of lack of sufficient space; for such cases a vertical type is made, which is identical with the type Fig. 2, except that a throttle valve is fitted into a straight, upward extension of venturi tube I.

Fig. 3 represents a sectional view through the standard type of Drego carbureter, which has no float and only a single fuel nozzle E. The fuel enters at B and is sprayed through the nozzle E. Fuel delivery is controlled by a needle valve D which is acted upon by a bell crank lever F. Air enters at A and passes through the throttle valve G, which is operated by means of lever I. Above the fuel nozzle is located the venturi tube L, at the top of which there is a hemispherical wire gauze strainer intended to more intimately mix and atomize the fuel. Levers F and I are connected together by an adjustable link (not shown) in such a manner that they can be moved simultaneously or separately, and that the needle valve D in the fuel nozzle opens a trifle earlier than the throttle valve G.

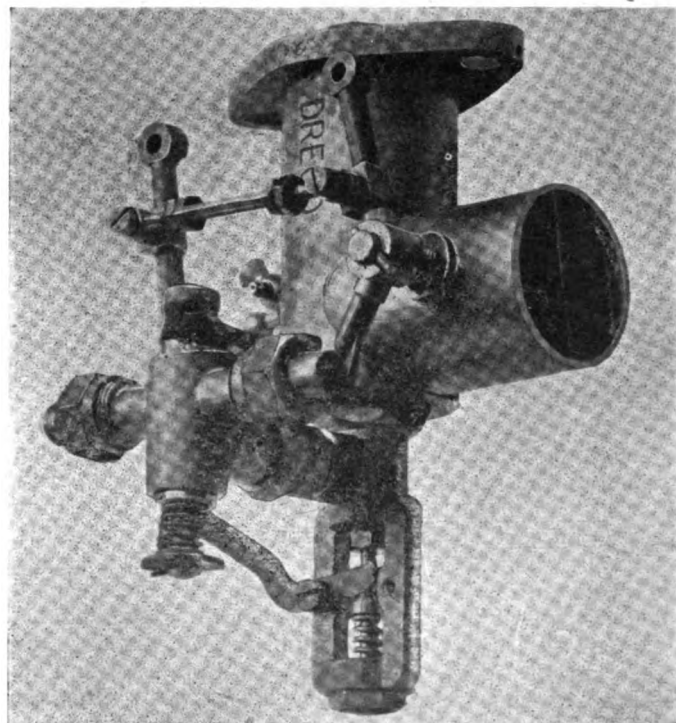
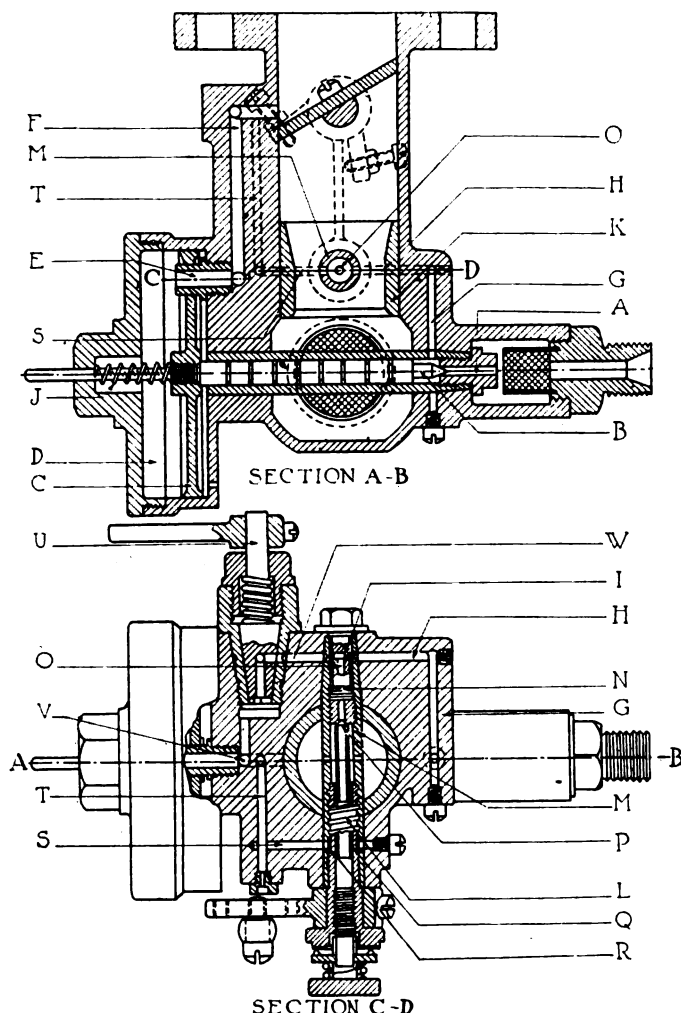


Fig. 5—Drego bi-fuel carbureter



Figs. 6 and 7—Sectional views of Adria carburetor

When the engine is at rest the spring below the bell crank F presses the needle valve into the fuel nozzle E, thus shutting off the fuel flow. While the engine is running the fuel nozzle is constantly cleaned by the moving needle valve. Owing to the fact that the nozzle E is located between the throttle valve and the engine inlet valve, the suction on it in starting will be much stronger than with the conventional construction, and the engine will therefore start more readily. In ascending steep hills it is possible to enlarge the fuel opening alone, thus obtaining a stronger mixture and increasing the power of the engine without increasing its speed. While coasting the fuel may be entirely shut off, so that none will be wasted. Of course, a skillful driver is required to properly operate the fuel nozzle and throttle valve for best results.

Drego Carburetor

The same principle is embodied in the Drego carburetor for super-compressed engines (engines using a compression of 120 to 130 lb. per sq. in.) which run on crude oil, gas oil mixtures, etc. It is impossible to start these engines directly on the heavy oil; for starting, either gasoline or benzol is used, and by means of a special device the engine is throttled down so that the compression does not exceed the normal. This is accomplished by means of the device illustrated in Fig. 4. The carburetor proper is the same as above described, and the letters have the same significance as in Fig. 3. However, the throttle lever is provided with an extension L which strikes the end of handle P of the two-way valve O,

whereby the opening of the throttle valve is limited. This occurs only as long as the two-way valve is set for gasoline. As soon as the engine is sufficiently warmed up the valve is turned so as to admit heavy oil to the engine and the throttle valve can then be fully opened. In Fig. 4, K is an adjustable link connecting the throttle lever I with the fuel valve bell crank F. Fig. 5 shows a photographic view of this carburetor.

The above described designs of carburetor resemble the standard type in that fuel must be fed to them either by gravity, pressure, or suction. The following types differ from the preceding ones in that they incorporate also a fuel feed, that is, they combine a floatless carburetor and a fuel feed device, working on the vacuum principle.

Vacuum Feed Carbureters

Figs. 6 and 7 illustrate the Adria combined floatless carburetor and vacuum fuel feed. In the upper part of the carburetor housing is arranged the throttle valve in the usual manner, while in the lower part of the housing is the automatic fuel valve, which, when the engine is cranked, is opened by the suction in the carburetor. This fuel valve consists of interchangeable valve seat A and the valve B, the stem of which at its left end is provided with a large disk piston C, adapted to slide in chamber D. This chamber communicates with the space above the throttle valve by channels E and F, hence, in case the engine is cranked up, if the throttle valve is closed, or nearly so, a vacuum is immediately created in it. Piston C is immediately drawn outward and the fuel valve is withdrawn from its seat, in consequence of which fuel enters through the fuel supply tube and the strainer. The fuel flows through passages G and H and through the small drill hole I into the main nozzle. While the engine is standing, spring J presses valve B against its seat, so that no fuel can flow through passages G and H, and consequently the fuel in the fuel supply tube cannot return to the fuel tank, which is located lower than the carburetor. Where the carburetor is used in connection with gravity or pressure feed, the fuel can neither flow through the nozzle or return to the tank, and in consequence there is always a certain amount of fuel at the orifice of the main nozzle, so that no difficulty is encountered in starting the engine.

Fuel Throttling Device

The fuel throttling device is arranged in the venturi tube K parallel to the throttle valve. This throttling device is provided with coarse thread L, and is operated by a link and lever connection to the throttle lever. This fuel throttling device consists of a horizontal tube M, provided with small radial holes; the main nozzle N is screwed into the tube M, and communicates through passage I and channels G and H with the fuel valve A, as already mentioned. The nozzle O is opened or closed by means of the linkage acting on the conical valve P. The latter is so adjusted, by means of the thread on its stem and a locking device, that for small openings the fuel feed is just sufficient for idle running of the engine.

When the engine is idling, fuel leaving the orifice O mixes with a certain quantity of air entering through passages Q, R, S and T, the latter of which discharges into the inlet manifold above the throttle valve. In order that the air may be mixed with the proper quantity of fuel for any throttle position, the fuel throttling device is so arranged that by means of the coarse thread L and the internal thread of tube M, conical valve P can be opened or closed as above described. The head of valve P connects by a link with the throttle valve lever and to

each position of the throttle valve corresponds a certain position of the fuel valve P. The throttle and fuel valve levers are both provided with a number of holes, and can be shortened or lengthened, whereby a corresponding adjustment is effected. The carbureter has a starting valve U by means of which the vacuum passage V can be shut off from the fuel passage W, if fuel is being drawn in. To prevent a return of the fuel to the tank, which is located at a lower level, a check valve must be provided at the lowest point of the fuel system.

For use in connection with the heaviest grades of fuel, such as crude oil mixtures, a new carbureter has been designed by engineer Graczyk, formerly designer of the Tuto Carbureter Co. and at present chief designer of the Adria Carbureter Co. Referring to the sectional views, Figs. 9-11, shaft H of the rotating valve T is driven at one-half crankshaft speed, and for use on a 4-cylinder engine is provided with four valve ports, X_1, X_2 , etc., for the main air, which enters through the right angled elbow G. Valve T rotates continuously; during the first part of the suction stroke, when the ports of this valve are closed, fuel enters the carbureter chamber through holes Z and a little air through the central hole of the fuel valve C_1 , while during the remainder of the suction stroke, when the ports X_1 and X_2 are open, the greater portion of the air required by the engine is admitted through them.

As during the first part of the piston stroke the interior of the carbureter is closed against the atmosphere, a very strong suction is created, which is sufficient to elevate the fuel up to the nozzle openings Z, but as soon as rotating valve T opens the air inlet, the vacuum drops considerably, and no more fuel enters through nozzle Z.

Atomizing the Fuel

Another object in admitting fuel and air separately during successive periods is to provide a uniform and thoroughly atomized mixture, for the air, entering through the central hole of the fuel valve C_1 , has a very strong atomizing effect, as a result of the vacuum existing in the carbureter chamber. Between the walls of the carbureter housing and the rotating valve T is inserted a sleeve X_1 , which can be rotated by means of knob F, guided in a slot of the carbureter housing, and serving to adjust the maximum cross-section of the air passage.

In the upper part of the vertical carbureter chamber is arranged the throttle valve and in the lower part is the fuel nozzle which consists of a transverse tube O, and the fuel jet proper D. The fuel enters through the

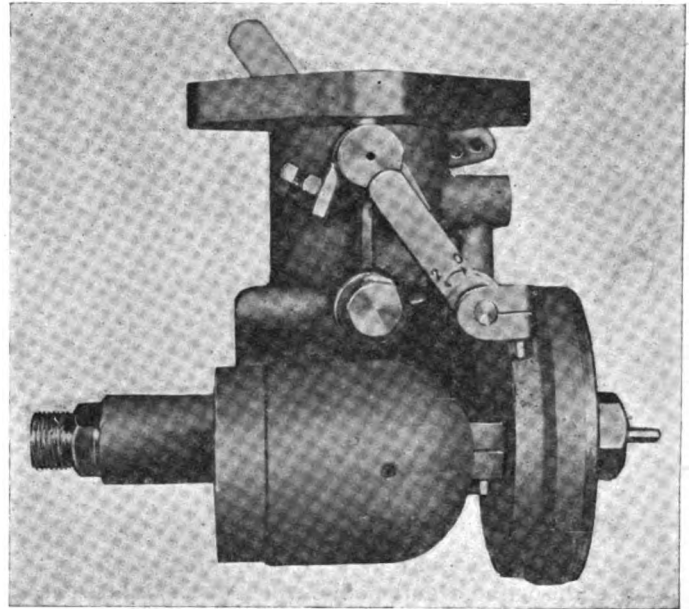
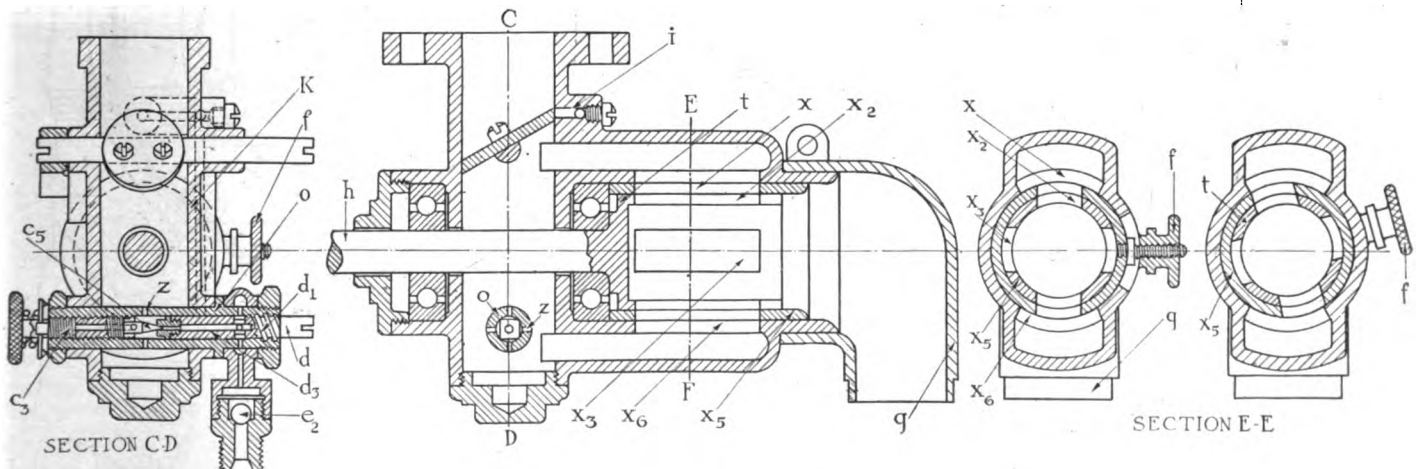


Fig. 8—Adria carbureter

ball valve E_1 , actuated by the vacuum in the carbureter, and passes through the nozzle D, the orifice of which can be closed by the valve C_1 . The nozzle D is squared on the outside, hence there is a passage between it and the tube O, and at idling speeds of the engine the fuel flows through this space to the passage K discharging near the throttle valve. Owing to the position of the throttle valve in idling, the fuel suction of the engine can never act on the mouth of passage K. When the throttle valve is farther opened the fuel is drawn in through holes Z of the main nozzle.

When the throttle valve is opened the fuel nozzle orifice must be opened correspondingly, and fuel nozzle D is not fixed in tube O, but can be turned and axially moved by the coarse thread D, with an extension D. To this extension a lever is secured, which is connected by an adjustable link with the throttle lever.

THE wooden steering wheel rim is little used on British cars, the type most favored being a cast aluminum frame with the rim coated with black xylonite or non-inflammable black celluloid. One variation has a built-up frame with aluminum boss and spokes and a rim of steel tubing similarly coated and usually knurled or slightly fluted to afford a better grip.



Figs. 9 and 10—Sectional views of Graczyk rotating valve carbureter. (This carbureter draws fuel directly from a tank at a lower level)

Fig. 11—Mechanically operated mixture and fuel throttle of the Graczyk carbureter

Another French Car Using Brakes on Four Wheels

Darracq now getting into production on eight cylinder car, which has been modified since exhibit at Paris Salon a year ago. Engine has removable heads and uses battery ignition. Four speed transmission and spiral-bevel final drive employed. Right hand drive retained.

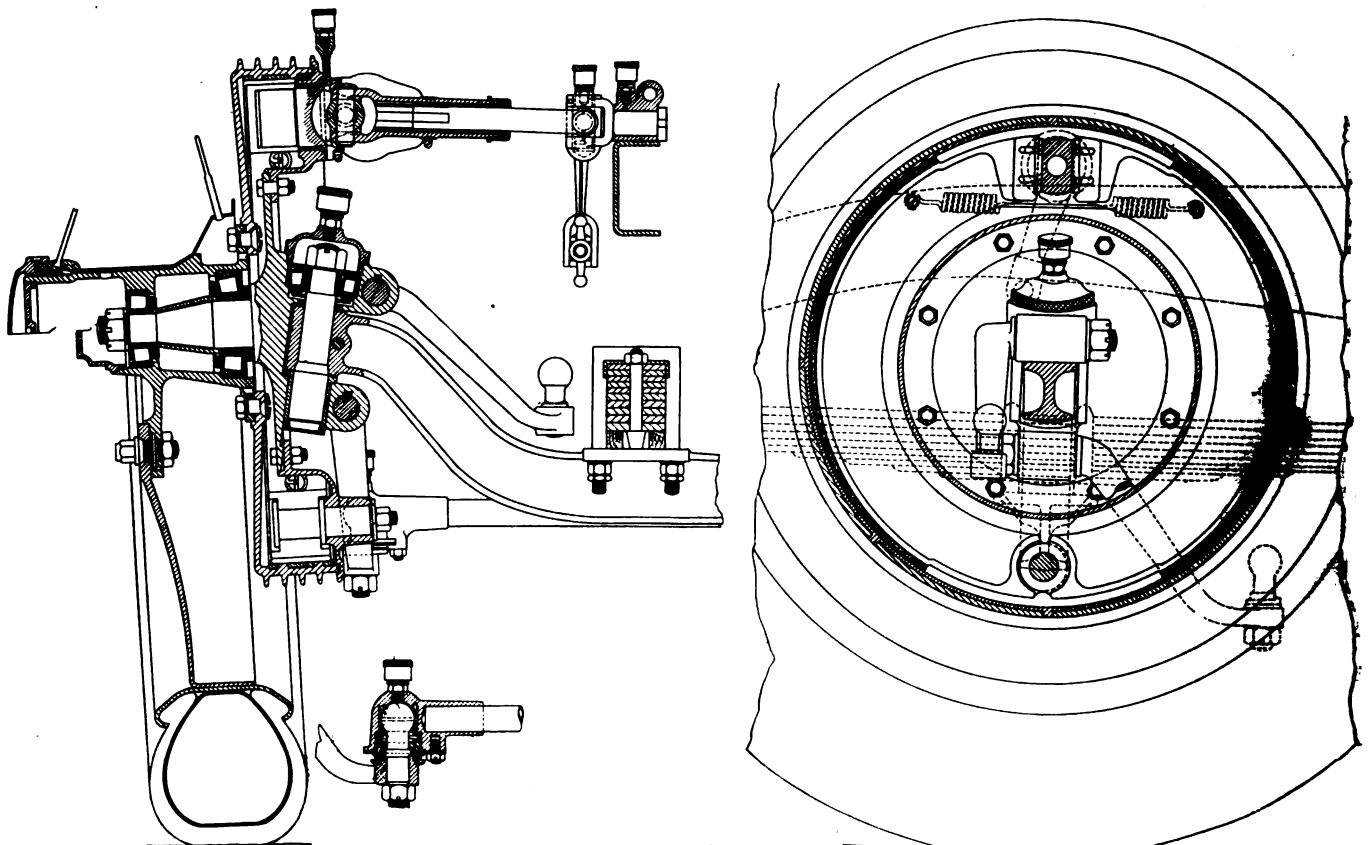
By W. F. Bradley

DARRACQ is just getting into production on the eight-cylinder automobile which was exhibited at the Paris Salon a year ago. After the show season this car was sent back for further experiments and tests and it comes forth now, not only with various improvements, but fully completed for production on a big scale.

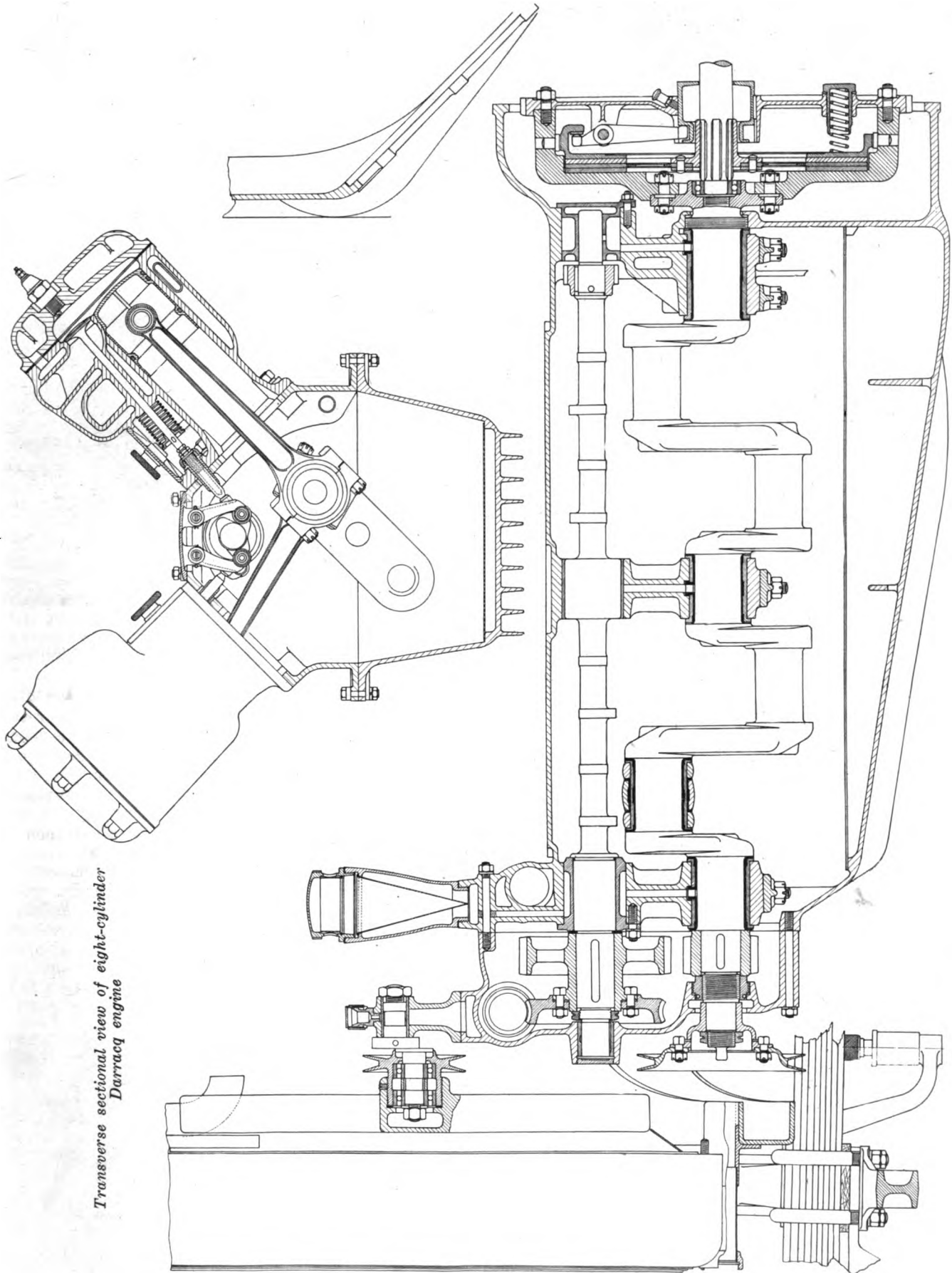
The most important change on the new Darracq is the adoption of brakes on all four wheels, under Perrot license. While the general design is the same as that of the Delage and Hispano-Suiza brakes, the Darracq has distinctive features and has been laid out very carefully with economical production in view. The brake drums are ribbed and cast aluminum, with cast iron liners let in, and the shoes are also aluminum with Ferode facing. The two sets, for front and rear wheels, are identical and interchangeable, the dimensions being 16 in. diameter and 2 in. face width. Operation is by means of a pedal, but the side lever also

locks the brakes and is intended for use when the car has to be held in a standing position.

One of the distinctive features of this braking system is the absence of any equalizer. From the brake pedal connection is made by rod to a lever mounted on a main brake shaft set across the frame. This shaft has mounted on it six levers: two (one at each extremity) for the front wheel brakes, two for the rear wheel brakes, one for the pedal, and one for the hand lever. The connection from the main brake shaft to the wheels is in two stages for both front and rear, in order to avoid the use of rods of unusual length. In the case of the brakes on the front wheel, the connecting rod runs from the lever on the main brake shaft to another lever mounted on a bracket bolted to the frame about on a line with the radiator. From here a second rod runs forward to a lever on the camshaft for the front wheel brake. This camshaft is telescopic and

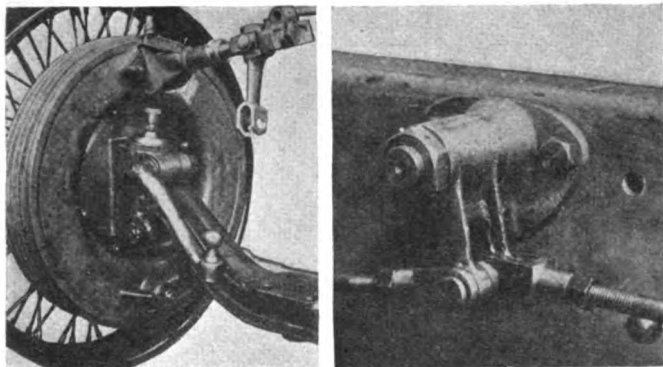


Front wheel brake and operating mechanism used on Darracq car



*Transverse sectional view of eight-cylinder
Darracq engine*

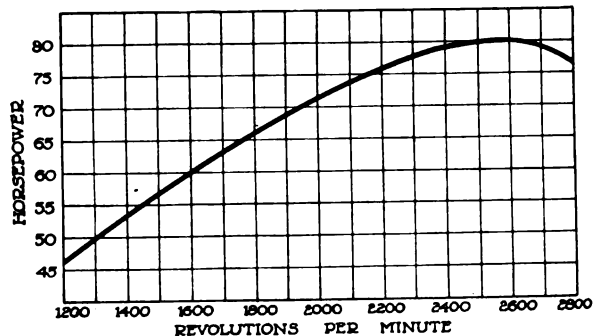
Longitudinal section of crankshaft and clutch, showing also arrangement of gears used for driving lighting generator and water pump



External view of front wheel brake and linkage on chassis frame for operating brakes

has a universal on its inner end mounted in the radiator trunnion bracket, as shown in the illustrations. Each brake has to be adjusted specially, this being accomplished by four winged nuts, two of them being alongside the frame members, in front, and two below the rear axle. They are set so that the pull is applied equally on all four wheels. Experience has shown that when once set the brakes wear evenly, and when wear does take place an equal number of turns on each of the adjusting screws will return them to their original condition. The writer has tested these brakes on a car fitted with a heavy sedan body, carrying six passengers, for a distance of 1000 miles over fast and mountainous roads, without having to make any adjustment on the brakes and with perfectly satisfactory results.

The front axle has been specially designed with a view to withstanding the extra stresses imposed by the use of

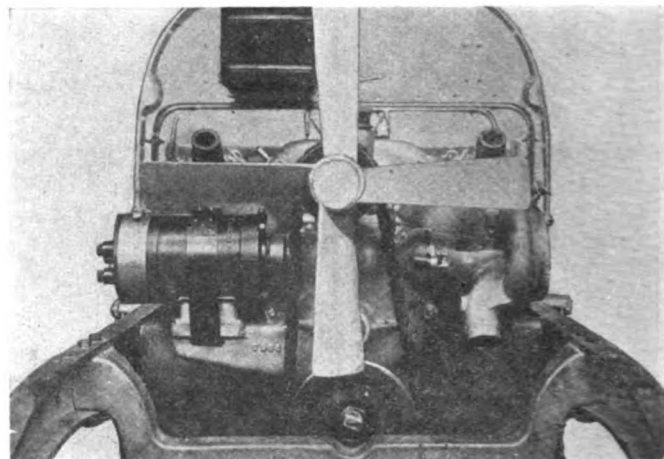


Horsepower curve of eight-cylinder Darracq engine fitted with special camshaft giving a valve lift of 13/32 in.

front wheel brakes. The steering pivots are inclined and are mounted with taper roller bearings.

Outside the braking system, only detail changes have been made in the chassis. The engine has 2.9 by 5.1 in. cylinders, with detachable heads, and develops 79.9 hp., with the peak at 2600 r.p.m. Delco ignition is used to the exclusion of the magneto. Connecting rods are forked type forgings and aluminum pistons are now employed. The carbureter finally adopted is the English Smith multiple jet, with hand controlled additional air inlet, with which the average gas consumption is one American gallon per 14 miles for open bodies and 12 miles for the sedan.

The powerplant is a unit construction. The transmission has four forward speeds and reverse and the final drive is by spiral bevel gears. In accordance with Amer-



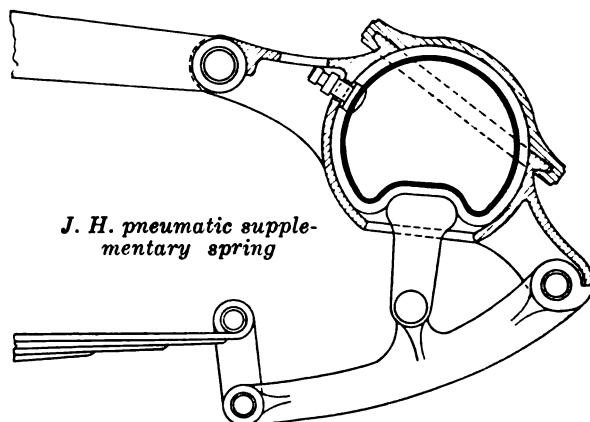
Front view of Darracq eight-cylinder, showing cross shaft operating water pump and lighting generator

ican practice, the gear-change lever is mounted directly on the gear box, but right hand steering is retained. Timken roller bearings are used both in the gearbox and the rear axle. The propeller shaft is of the open type with two universals. The rear axle housing is composed of two steel stampings welded together to form a banjo casing. Both the forward housing, carrying the driving pinion, and the rear cover are aluminum castings. Suspension is by semi-elliptic springs in front and cantilevers at the rear. These latter have double attachment to the bronze bushed spring pad on the axle, both the main and the secondary leaf having eyes rolled on their ends. Rear springs are 2 3/4 in. wide.

Swiss Pneumatic Spring Introduced Here

AT various times in the past supplementary spiral springs have had considerable vogue in automobile practice, having been used first in the open and then in the closed form. For some cars, notably the Ford, these springs are still being sold in considerable numbers and are often incorrectly referred to as shock absorbers.

A pneumatic supplementary spring developed in Switzerland and known as the J. H. has been brought to this country by Walter A. Wetterwald. Its design will be readily understood by reference to the accompanying sectional view. The advantage of the pneumatic over the steel supplementary spring is that the effect of the former can be readily varied by inflating to a higher or lower pressure. Since the inflation pressure is much lower than that of tires, loss of pressure is slower.



J. H. pneumatic supplementary spring

Reactionary Country Exports Radical Car

German built Sauer has constant mesh gears with positive clutches controlled by hand selector mechanism. Gear change effected by operation of clutch pedal. Roller worm-wheel used in final drive.

A CAR imported into this country from Germany by Mazzoli & Schendel, Inc., known as the Sauer, has some features which are rather radical in motor car practice. Chief among these are an automatic mechanical gearshift and a worm-roller wheel drive. Control is entirely by pedals, there being no control levers on the car. There are three pedals, similar in design and mounted concentrically, for the clutch, the service brake and emergency brake respectively.

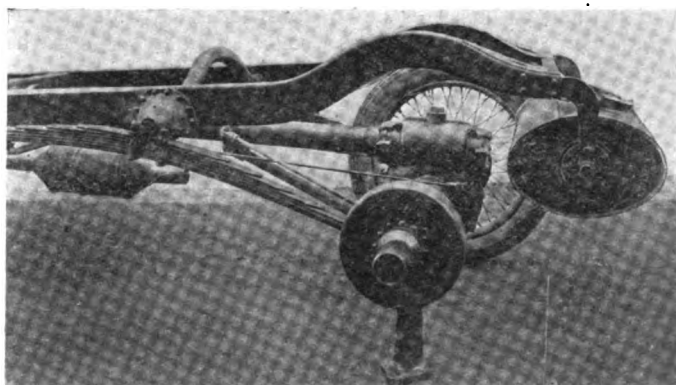
The car has a four cylinder engine of 80 mm. bore and 130 mm. stroke (3.15 x 5.12 in.). The wheelbase is 124 in. The carbureter is a Pallas-Zenith, with horizontal outlet, vacuum feed from a 15 gal. rear tank, and hot air supply. Ignition is by high tension magneto and lubrication by the circulating splash system.

Back of the flywheel the design of the car is decidedly unconventional. There is a multiple disk-in-oil clutch in the flywheel. The transmission is located amidships.

The gearset affords four forward speeds and a reverse. Gears are not shifted into and out of mesh but remain in mesh constantly. They are locked to the shaft and freed from it as desired by positive clutches of the internal and external gear type. Control of the gears is effected by means of a selecting mechanism in conjunction with the clutch pedal, the principle being somewhat similar to the magnetic gear shift quite familiar to American engineers. In the car here illustrated the selector lever is mounted on the instrument board, but this feature will be changed, and in future it will be mounted on top of the steering wheel on a stationary sector. The driver can set the selector lever at any time. For instance, while driving on high gear on the level, when seeing an upgrade in the distance, he can set the selector in the third speed position. Then, when he reaches the grade and his engine slows down in consequence of the increased traction resistance, he simply depresses the clutch pedal, whereupon the fourth gear or direct drive is disengaged and the third gear engaged automatically. The driver then releases the clutch and the car continues on the third

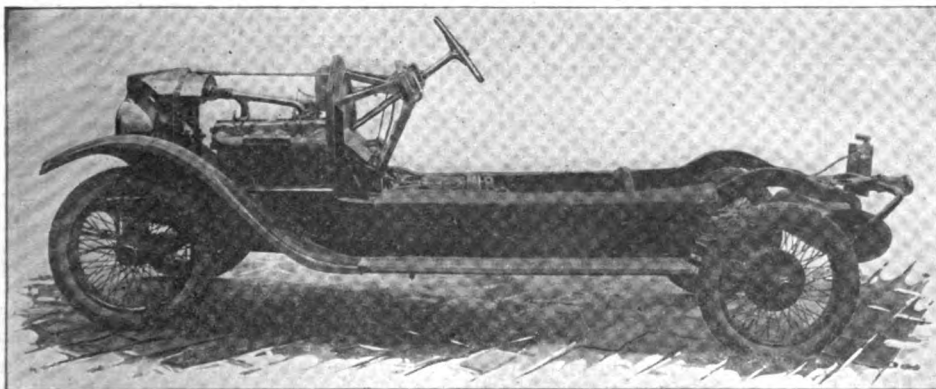
gear. It is claimed that there is absolutely no clashing of gears, and it seems reasonable to suppose that the automatic shifting mechanism works out better with a positive clutch type of change gear than with the sliding pinion type. The shifting mechanism is described as similar in principle to the mechanism of a player piano.

The final drive is by a worm and roller wheel, a type of

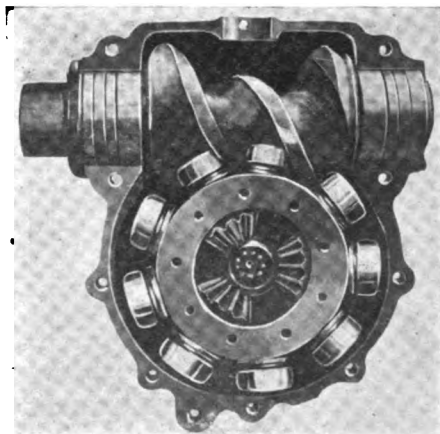


Rear end of Sauer chassis, showing cantilever springs, rear axle structure and rear fuel tank

mechanism which has been used in Germany for a good many years (Pekrungetriebe). This is claimed to operate at a maximum efficiency of 97 per cent. The rear springs are of the cantilever type. Torque and thrust are taken by the propeller shaft tube. There are two stay rods running from a point on the torque tube substantially in line with the center mountings of the rear cantilever springs to the ends of the axle housing, and in addition a third stay rod runs from the same point on the torque tube to the lowest point of the gear housing of the rear axle. The rear axle is of the three-quarter floating type.



Chassis of Sauer leverless car



Worm-roller wheel final drive

New Model of Single Sleeve Valve Engine

The type of valve formerly used by Argylls is revived in improved and simplified form. Removable port liners used in cylinder. Valve is given a combined oscillating and reciprocating motion. Heads are detachable.

PREVIOUS to the war a single sleeve valve engine known as the Burt-MacCullum was manufactured by Argylls, Ltd., of Alexandria, Scotland, and also under license by Picard & Pictet of Geneva, Switzerland. Since the failure of the old Argylls Co. not much has been heard of this engine, but now a post-war design is announced by the Wallace Farm Implements, Ltd., Cardonald, Glasgow, Scotland, the parent licensing company. The engine, of which illustrations are shown herewith, is a four-cylinder of $3\frac{1}{8}$ in. bore and $5\frac{1}{8}$ in. stroke. This gives a rather high stroke bore ratio, viz., 1.625. A high compression

ratio is also used, namely, 4.8. There are three inlet and two exhaust ports in the single sleeve, these ports retaining the same characteristic form as in the pre-war model.

The principal differences between this engine and the pre-war Burt single sleeve valve engine are as follows: A new and simpler design of mechanism is used for driving the sleeves; the cylinder construction is simpler and the heads are now easily detachable. Detachable port liners are fitted in the cylinders. A hot spot induction system is used. Other new features are force feed lubrication to all bearings, three point suspension, lighting generator and starter incorporated in the design, greater accessibility of water pump and magneto, cleaner exterior and reduced weight.

Valve Actuation

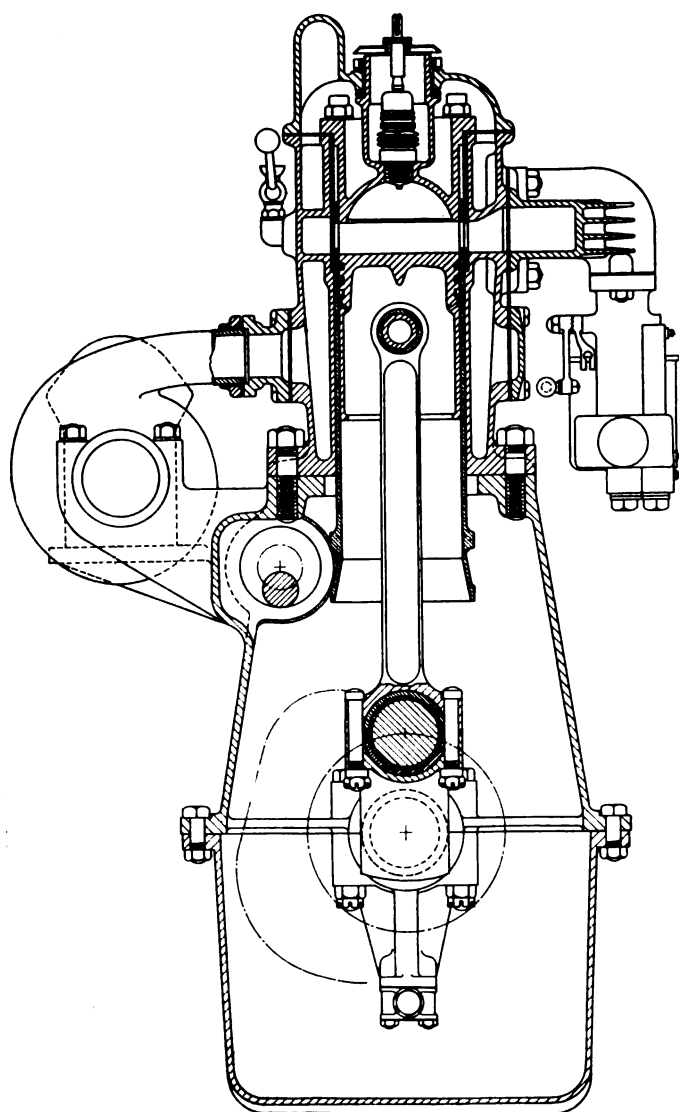
Referring to the sectional view, the valve shaft is driven from the crankshaft by means of a silent chain at half engine speed. This valve shaft is in reality a small thrown crankshaft with a throw approximately opposite each cylinder. Working on each crankpin and lying in a horizontal position is a short link or connecting rod the outer end of which is fitted between two lugs projecting from the bottom end of the sleeve. A fitted bolt passes through these lugs and also through the end of the link which is between the lugs and forms a working joint which allows the link to move only at right angles to the sleeve valve.

It will thus be seen that as the valve shaft revolves and the sleeve link goes up it carries the sleeve with it, and as it goes over the top center it pulls the sleeve round in the cylinder. As the crank goes down again it also carries the sleeve down, and as it goes over the bottom center it takes the sleeve back again to its starting point.

This motion, as will be seen, imparts to the sleeve a combined reciprocating and oscillating motion, and a fixed pencil held against the sleeve will mark thereon an ellipse. It will thus be seen that all ports in the sleeve travel in an elliptical path along the walls of the cylinder, so that corresponding ports in the cylinder are only uncovered by corresponding ports in the sleeve once in a complete revolution of the sleeve shaft or in two revolutions of the crankshaft. The special shape adopted for the ports gives the maximum opening with the minimum travel of the sleeve.

The cylinder is closed at the top end by means of the head, which may be described as a fixed piston, this piston being of the same diameter as the motor piston and projecting into the cylinder, so that between the cylinder wall and the head an annular space is formed in which the top end of the sleeve works. This annular space acts as a seal for the ports during the explosion stroke.

In the pre-war single sleeve valve engines the cylinder ports were cut in the solid cylinder block, but in this engine these ports are simply cored in the cylinder, and a short liner, with the ports cut therein, is pressed into a



Burt-MacCullum engine using single sleeve valve similar to that used on Argylls

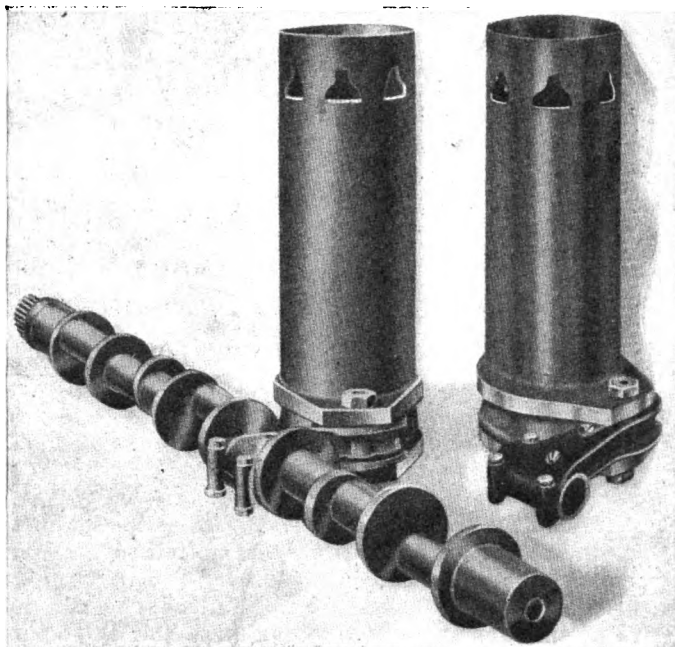
recess in the top of the cylinder. This is a very much cheaper operation than cutting the ports in the cylinder block and has been found very successful.

Exhaust and induction systems are cast integral, giving "hot spot" construction. The lubrication system is pressure feed throughout, including the big ends, a very simple type of pump being employed. This pump differs from the usual plunger pump, inasmuch as the long spring is in tension when pump is in operation.

No oil or other connections are made on the bottom portion of the crankcase, which is therefore easily detachable. The oil filter is in an accessible position in the top portion of the casing, and easily withdrawn without the loss of oil.

A RECENT communication from a trade correspondent in England says:

"The 'scooter' having failed to catch on here, certain enterprising interests are trying its chances as a tradesman's parcel carrier, but a machine that has little scope as a passenger carrier would seem to have less as a tradesman's carrier. The objection to the scooter—here, at least—is that its wheels are of such small diameter that it vibrates too much, and rough travel tends to bring about early disintegration of its vitals. For this reason it is to be expected that its career as a tradesman's carrier will be short."



Sleeve valves and actuating mechanism as used on Burt-MacCullum engine

An Adjustable Impulse Coupling

A N impulse coupling for use on truck, tractor, marine and other heavy engines which are difficult to spin by hand, has been developed by the American Bosch Magneto Corp. This device gives the armature a short quick turn when the engine is cranked over.

The impulse member consists of a hardened steel housing fastened directly to the magneto shaft. Inside the housing are two arrester weights which move in and out, guided by tongues on their rear which fit into slots in the housing. The coupling is so arranged that the tongues of the arrester weights engage with the steel block of the arrester plate, which is fastened to the shaft end-plate of the magneto.

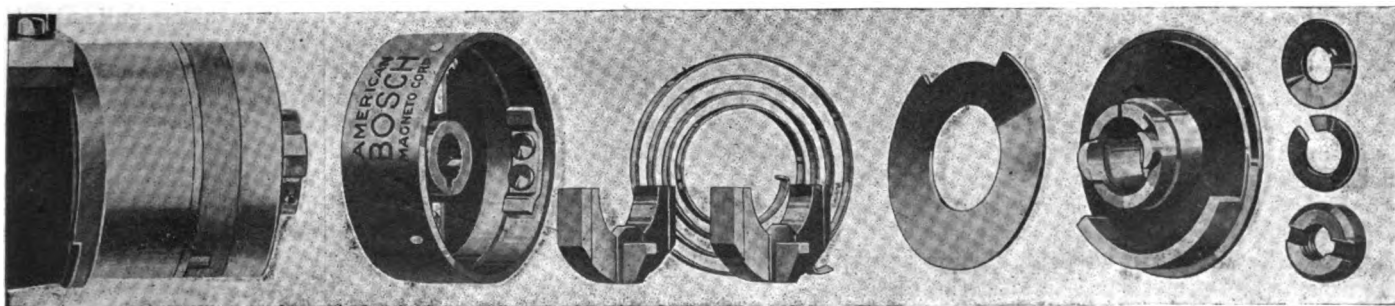
A spring made of highly tempered steel acts as a connecting link between the housing and what might be termed its cover, which is known as the driving flange. One end of the spring is fastened to the outer edge of the housing, the other end is anchored in the hub of the driving flange. The hub of the driving flange carries two cams, which lift the arrester weights at the proper instant, thus releasing the spring.

When the engine is cranked, the impulse coupling is in its normal position, the tongue of one of the arrester weights resting against the arrester block and holding the housing stationary. As the engine is turned further, the driving flange revolves and winds up the spring. At

a fixed point one of the cams on the driving flange lifts the arrester weight clear of the arrester block, and the wound spring is released, giving the magneto armature a quick turn. This causes the magneto to deliver an intense spark in the cylinder then under compression and starts the engine. As soon as the engine attains a speed of 100 to 120 r.p.m., centrifugal force throws the weights in the coupling housing to its outer surface, holding the tongues clear of the arrester block and causing the entire mechanism to act as a flexible coupling.

When this impulse coupling is used to start an engine, it is impossible for the engine to back-fire, because the adjustment is such that when cranking the spark occurs only after the piston has passed top dead center position.

I N Great Britain, where motor vehicles are being taxed on a horsepower basis for the first time, the question has been raised whether electric industrial trucks which may be run over short stretches of public highway from one factory to another or from one department to another, are subject to the tax. The Electric Vehicle Committee of the S. M. M. & T., which took this matter up with the Ministry of Transport, was at first assured that there was no need for a license for such trucks, but later was informed that whether or not a license was required would depend on the circumstances of each case.



Assembly and parts of Bosch impulse coupling

The Handy Man About the Plant Is a Handicap

The jack-of-all-trades may be a useful person when an odd job is to be done at home. His activities in the modern industrial plant, however, not only hinder efficient production, but endanger the safety of fellow-workers. This article tells some interesting incidents to prove the point.

By C. A. Briggs

A "HANDY man around the house" is useful in the home, but in the factory his activities are likely to do more harm than good.

In every factory there are specialists who can take care of emergency needs in a far more efficient manner and with greater permanence and safety, than can the "handy man." But regardless of the presence of tool makers, machinists and carpenters, blacksmiths, plumbers, millwrights and repairmen, who may be called at short notice, the handy man still plies "his trade." Evidences appear in every large plant in the home-made ladders, hammers, screwdrivers, wrenches, punches, patched up machines, etc.

There seems to be no limit at which the inventive nature of the handy man will stop. Some of the most intricate machines must yield themselves to his experimentations. Safety devices seem to be a special prey to the ingenious mind of such a man.

I have seen improvements and adjustments made on circular saw guards that made the saws positively dangerous to operate. Frequently punch press guards are found whose functioning has been interfered with by some operator who was trying out a fancied improvement. The result is usually a situation we used to hear about in politics—"Protection that does not Protect."

Constructive ideas coming from the employee should not be discouraged but should be passed upon by some one competent to judge of their worth. Perhaps a man will spend long hours in studying out an idea that has already been given a trial and abandoned as impractical.

Recently a device was submitted to a safety division for approval that had been worked on for over a year. It was a good idea, basically, yet overlooked one factor that made it of very little value as a safety device. Men do not take into consideration that there are some State industrial laws that say very definitely just how a device shall function and how much protection must be provided for. Even manufacturers of safety devices have sometimes ignored this fact and have had to change their plans.

A "follow up" of the causes of accidents indicates that men are needlessly injured in carrying out experiments that a little forethought and judgment would have shown to be impractical and unsafe.

A few months ago, for example, during an excessively hot period, a man working on a drill concluded that he would construct a fan to bring into the room the same cooling zephyrs that were blowing the tree tops on the distant hill side. He cut out a rude design of a fan from some scrap metal and tacked the blades on a wood pulley wheel. This "fan" he clamped on the swiftly re-

volving shaft of his machine. The safety man saw the "fan" cutting wide circles in the air. Stopping the machine he discovered that the metal blades were imperfectly fastened to the wood wheel and were in immediate danger of breaking loose and flying out over the department, carrying a cutting edge that would rival a razor for sharpness.

Another instance of misdirected energy appeared recently when an electric truck driver rigged up an extension to his foot levers that he might thereby sit more comfortably on the padded cushion he had picked up somewhere in his travels and could thus fill his working hours with ease. Shortly after he had succeeded in equipping his truck with these "fatigue features" he was called away on another job. His understudy was unfamiliar with the new contrivances on the foot levers, became confused as he was approaching an elevator gate and went crashing through. Fortunately, he happened to be on the first floor and the accident did not result seriously, although it nearly ruined the truck with its chair car equipment.

Visiting a garage a short time ago, I was at once attracted by the strong odor of gasoline fumes. I walked over to where a man was cleaning an automobile and found that he had rigged up a combination whereby he was forcing gasoline and water by air pressure through the hose. This allowed the gas fumes to fill the garage with such a density as to make breathing very uncomfortable to say nothing of the still greater hazard from explosion. A knife switch appeared, moreover, on the side wall. Here were all the elements necessary for a catastrophe. The man said it was the best method he knew of for cleaning an automobile.

These things are dangerous; men do not take the time to think a thing through. If a ladder is a few inches short they will not take the time to go for a longer one, but will pick up a couple of boards and nail them to the side rails or stringers of the ladder. This often splits the stringers and makes a very unsafe extension.

Tool handles that are broken are often spliced with wire or nailed, when across the way is a department maintained to do just such jobs as this by replacing. Elevator gates are found with stilts nailed on them so men will not have to stoop down so low in raising them. The "handy men" who do this do not think that this will allow stock or trucks to roll under the land on the elevator should it happen to be down at this time.

The accompanying photograph shows other examples of the handy man's work. In the center is an emery wheel which had been fitted up with a milling machine cutter when the flange to the wheel had been mislaid.

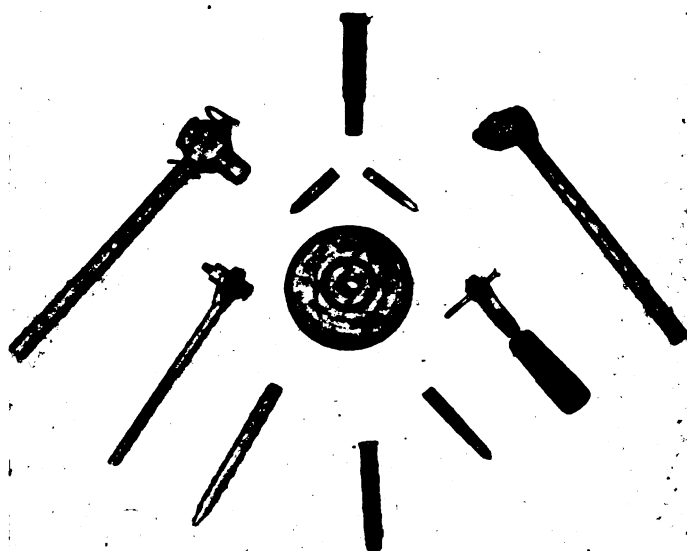
The setting for an injury here could not have been more accurate had the man desired that rather than to save a trip to the stock room for another flange.

On either side of the emery wheel is shown a crude attempt of workmen to make wheeldressers. These two dressers are used for truing up emery wheels which have become grooved or uneven. The tool is held against the rapidly revolving wheel and the steel cutters grind into the stone. A safe type of wheel dresser is furnished at this plant and these attempts were a very unsafe imitation, as will be noted in examining the one with a spike upon which the cutters revolve. Should one of these little toothed wheels break or become loosened from the spindle it would fly with the velocity of a rifle bullet. The wheel dressers adopted as standard by the safety division have a small hood over the wheels which will deflect them downward should they break.

The hammers shown in this photograph were found in the hands of workmen and were not borrowed from the antiques in the city museum. They would be a credit to the man of the Stone Age, but should not be found in a modern factory.

The other small tools, drift pins and punches were made from odd pieces of stock and old files. They were confiscated because they were too hard and flaked off when struck with a hammer. This material is too highly tempered to be used for this purpose. The small pieces that break off fly with great velocity and may imbed themselves deeply into the flesh or eye.

A semi-technical magazine recently carried an article and sketches showing how hand pullers can be made in great variety from old files. The sketches look good and no doubt the tools could be used in the variety of ways



Dangerous tools

indicated by the article. But the writer failed to make clear one important point; namely that the temper must be drawn before using, and by one who knows how.

The handy man who tackles any kind of a job around the plant may be all right in some places, but his useful scope is extremely limited. In the modern plant that employs specialists in all the different lines, the handy man usually intrudes; such work as he attempts should be assigned to the men who have the tools to work with and who can do the job properly.

Development of the Tungsten Industry

TUNGSTEN is one of those metals the uses of which were greatly developed by the war. For about 20 years Germany directed toward Hamburg the greater part of the minerals of this metal and secured control of the products of the minerals and the manufacture and sale of the metal.

Although it was the largest producer of the minerals, the British Empire itself did not escape the German control. After the mineral arrived at Hamburg, it was refined, and then the metal was sold to the manufacturers of high speed tool steel at Sheffield.

Making exception of a small amount of minerals derived from the neighborhood of Limoges, French metallurgists also obtained the minerals necessary for the manufacture of ferro-tungsten from Hamburg, and French steel works procured from the German refiners the tungsten powder necessary for the manufacture of special steels. Not only was France dependent upon Germany for the minerals and the metal, but it also procured from it numerous finished products with a tungsten base, such as magneto magnets, high speed steels, electric lamp filaments, etc.

After the declaration of war, the necessity for an extended production of ammunition impressed upon the Allied Governments the imperative need of procuring abundant supplies of tungsten, in order that the ammunition factories might have all the high speed steel necessary for machining artillery and aviation equipment.

Great Britain, which possesses abundant sources of the mineral in its colonies, requisitioned the mines and developed their production. France, whose resources in tungsten minerals are very slight, found itself in competition on the neutral market with the United States and

with the neutrals working for the Central Empires. The increase in price of the mineral, resulting from this competition, caused a material increase in the production of the mines, and the opening of new deposits which had remained unexplored up to that time. Notwithstanding the efforts of her own metallurgists, France remained tributary to England during the first year of the war, for the supply of the mineral and of high speed steel. The United States made serious efforts, and in 1918 succeeded in obtaining on its own soil the quantities of mineral necessary for the supply of its own war industries with high speed cutting steels. Commissions were appointed between the Allies not only with a view to rendering the blockade of the Central Empires effective, but also to controlling and distributing in an equitable manner the world's production of this mineral.

The consumption of high speed steel in France, which in 1910 amounted to 300 tons, had reached 1000 tons at the beginning of the war, and nearly 9000 tons during the year 1918. In the course of the war, the sales price of high speed steel was subject to wide fluctuations. Its intrinsic value, which even in normal times is quite high, was considerably augmented. The price varied from 60 cents and \$1.00 per pound, according to the tungsten content, all the way up to \$2.00 and \$3.00 per pound.

In the United States the price rose to \$2.50 per pound and this high price prevented exportation. Sheffield Steel Works, on the other hand, delivered the steel in France, carriage and import duty paid, at a price varying from \$1.00 to \$1.50 per pound. French steel works, which had to pay a higher price for raw materials, asked from \$1.60 to \$2.30 per pound for the steel.

Foundry Conveyor Equipment Offers Ideas for Adaptation Elsewhere

The methods of handling castings and other material by means of various types of conveyors add particular interest to the foundry described in this article. The best standards of modern foundry practice are also illustrated by many of its features. A pleasant place to do efficient work.

By Norman G. Shidle

It is not common to find production equipment in a foundry which offers suggestions for bettering methods in other parts of the factory. Foundry practice and conditions in general are not up to the standards common to other parts of the manufacturing plant. Modern foundries, however, are beginning to embody such improved equipment that a detailed study of their methods is of interest from more than one point of view.

The mechanical conveyor systems used for handling castings and material in the foundry described in this article, for instance, present data of particular interest, since suggestions may be found for adaptation in production processes not connected with foundry work. It is well equipped in other respects, too, and shows the best standards in modern foundry practice. Consequently, this foundry of the Hercules Gas Engine Co., which was erected about a year ago, has features of interest from both viewpoints.

The structure embodies many interesting details of construction and equipment, and has been so built as to facilitate the handling of material and the efficient production of castings.

The foundry is designed to manufacture the castings for farm engines of from $1\frac{1}{2}$ to $12\frac{1}{2}$ hp. While there is little activity at the present moment, this foundry is able to produce all the castings for the 120,000 engines a year which constitute the production schedule of this firm for a normal year.

The storage bins for coke and scrap are adjacent to the railroad, thus necessitating only unloading from the car directly into the bins. Fig. 1 shows how the unloading and handling of material is accomplished.

Material is unloaded from the cars by means of a suspended mechanical belt conveyor. This eliminates the necessity for much handling, and allows the material to be

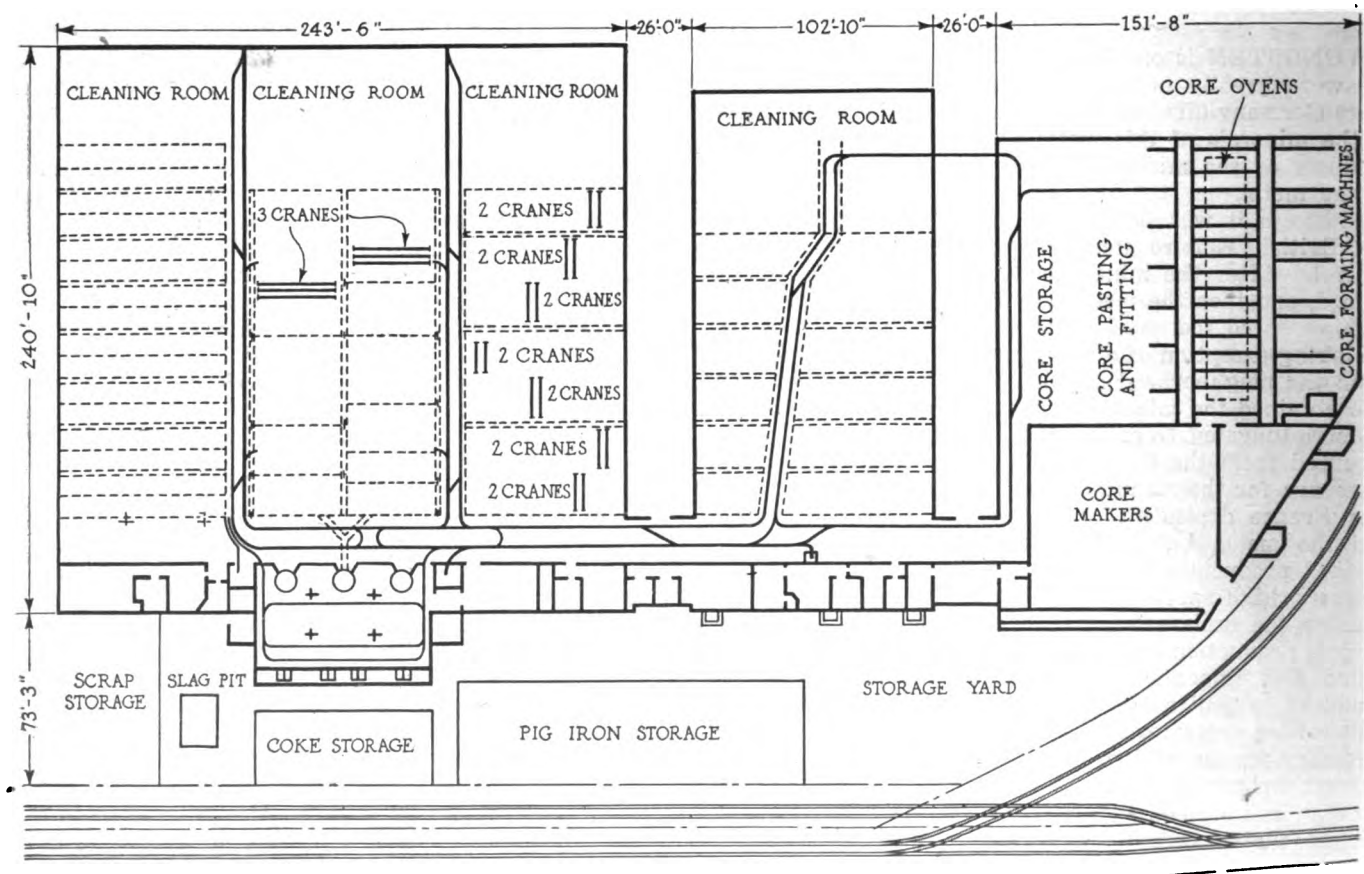


Fig. 5—Ground plan of entire foundry

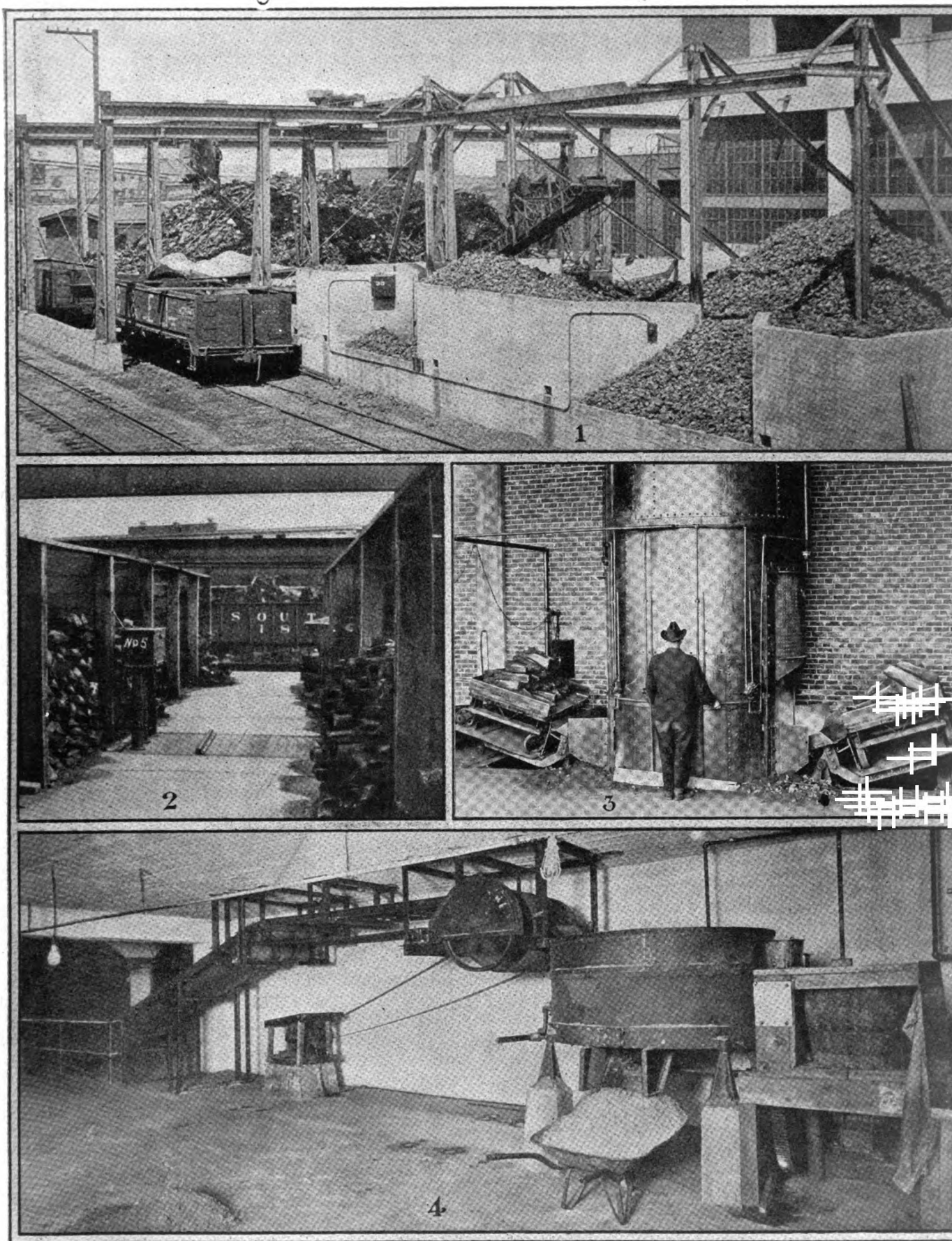


Fig. 1—How material is handled from the cars. Fig. 2—Charges of iron are weighed on these scales, before going to the cupola; no time is lost since scales are provided for each group of bins. Fig. 3—Charging both sides of cupola at once with charging machines. Simultaneous charging from both sides eliminates uneven distribution of coke and iron. Fig. 4—Rotary core sand-mixing machine, ejecting sand into wheelbarrow

transferred rapidly from the car to the storage bins. In the case of sand and coke for the core ovens, the conveyor carries the material to a hopper, from which a belt conveyor automatically carries it to the basement where all such material is stored.

Charging material for the cupolas is carried from the storage bins on electric trucks. Each charge is weighed after being loaded on the truck. Fig. 2 shows the position of the scales in relation to the storage bins. From here the truck is run on to an electric elevator and raised to the charging floor, which is 27 ft. above the foundry floor. The charging floor is of concrete construction, is open on three sides and covered overhead. This open construction gives plenty of fresh, pure air to the men, and is the best possible arrangement for the major part of the year in the climate of southern Indiana. In a more northern location, however, it would not be adaptable, while it is probable that even here a man might have to work very rapidly to keep warm during the more severe part of the winter.

The charges of coke are placed simultaneously in both sides of the cupola, as shown in Fig. 3. The two charging machines are pneumatically operated. These machines tip the cars so that the charge is carried into the cupola by gravity. The trucks for carrying this material have been specially designed, so as to be adaptable to these charging machines. The cars which carry pig iron and scrap are open on one side, while the coke cars are so constructed that one side can be lowered. One of the chief objections to charging machines in the past has been that they tend to give an uneven distribution of iron and coke. By charging from both sides at once this objection is overcome.

There are three 96-in. Whiting cupolas which melt between 250 and 300 tons of iron each day when the foundry is in full production.

The equipment of the blower room, which is located on a mezzanine floor, consists of three motor drive rotary pressure blowers, each of which has a capacity of $52\frac{3}{4}$ cu. in. per minute. These blowers are connected with the cupola by a pipe which runs through the floor.

Fig. 5 is a ground plan of the entire foundry and indicates the position of the various departments. The structure is divided into three sections, separated by open bays which provide an excellent supply of light and air throughout. Each bay is devoted in a general way to a particular type of work, the main bay being used for molding the heavier castings, such as flywheels, bases, etc. The cupolas front on this wing.

The second section is used for cylinder molding and for other work requiring a special mixture of iron. The core department is located in the third section.

Features of Core Department

A number of interesting features are embodied in the operation of the core department. From the basement storage the core sand is carried by wheelbarrow to a hopper. From the hopper it is carried by a belt conveyor to a rotary core sand-mixing machine, Fig. 4. Core and sand mixture have been so standardized that workmen need merely to dump the proper number of wheelbarrow loads of sand into the hopper and turn the crank on the oil and water feeders a certain number of times. The sand mixing machine is operated by electric power.

A wheelbarrow catches the sand as it comes from the mixing machine. It is then carried by elevator to the mezzanine floor above the core room. The sand is then discharged into hoppers which lead down into the core room, the core sand for each man falling directly upon his work bench. The core-makers' benches and the discharged sand are shown in Fig. 6. This photograph also shows the arrangement of the molding machines on which the majority of the cores are made.

Adjacent to the core room are the core ovens, seven in number. Similar types of cores are made in certain sections of the core room, adjacent to the various ovens. Thus similar cores are baked in the same oven.

When a group of cores are completed they are placed upon core racks, similar to those shown in Fig. 8. These racks are hung on springs, and operate on trolleys which engage overhead monorails. To connect the tracks running from the core benches to those running through the ovens, a transfer crane is operated on a runway over the aisle between the ovens and the core department. Thus a core rack is filled in the core departments, run into the oven, baked, and removed on the other side of the oven without its contents being disturbed.

After baking, as noted, the cores are removed from the oven on the side opposite the core workers. This allows the cores to cool without spreading obnoxious fumes near the workers, and also makes for efficient movement of the work. Radiation of heat from the ovens is prevented by a lining of Insul brick, and thus another source of discomfort to the workers is removed.

Molding Machines Used

On the main molding floors, the men use portable molding machines. They start work at the connecting aisle, setting down their molds as completed until the far end of the molding floor is reached. The overhead monorail system is used for all heavy work, including the pouring of castings. Fig. 9 shows a part of the main molding floor and illustrates the use of the monorail system in pouring the molds.

The floor plan shows that the cleaning rooms are located in each case at the end of the section. By thus locating them, it has been possible to provide for an elimination of the dirt and dust which accompanies these operations. Each cleaning room is equipped with swing grinders and dust collectors. The collectors carry the dust out into bins, which in turn are carried by an elevated track to the railroad platform.

It will be noted that the work follows a definite and efficient course. Referring again to the ground plan, Fig. 5, it is seen that the melted iron passes from the cupolas to the molding floor and is poured into the castings. The casting later goes straight ahead to the cleaning room at the opposite end of the buildings.

A specially designed machine is used to reclaim sand after it has once been used. This machine is the work of R. G. McSherry, foundry superintendent, and is illustrated in Fig. 7. The sand is left in piles after the molds have been shaken out, and this sand mixing machine, operated by an electric motor, runs along slowly, picking up the sand in the oblong buckets, dumping it into the mixing device, and ejecting it after it has been thoroughly mixed. Exceptionally good results have been obtained from the use of this machine.

The mechanical equipment for the entire foundry was installed under the supervision of Clement A. Hary, engineer in charge of mechanical equipment. It is designed throughout to enable men to work effectively, benefiting both employer and employee. Pond roof trusses with top hung sash are used, and excellent light and air is provided even during periods of full operation. Ample working space minimizes the chances for accident, while the use of the overhead system for pouring off makes for safety as well as efficiency.

Adequate toilet facilities are provided, and the toilets are kept in excellent condition. Shower baths are not only provided but are used, and in many ways the management is attempting to make its handling of the human element consistent with the high standard of material equipment which the foundry presents.

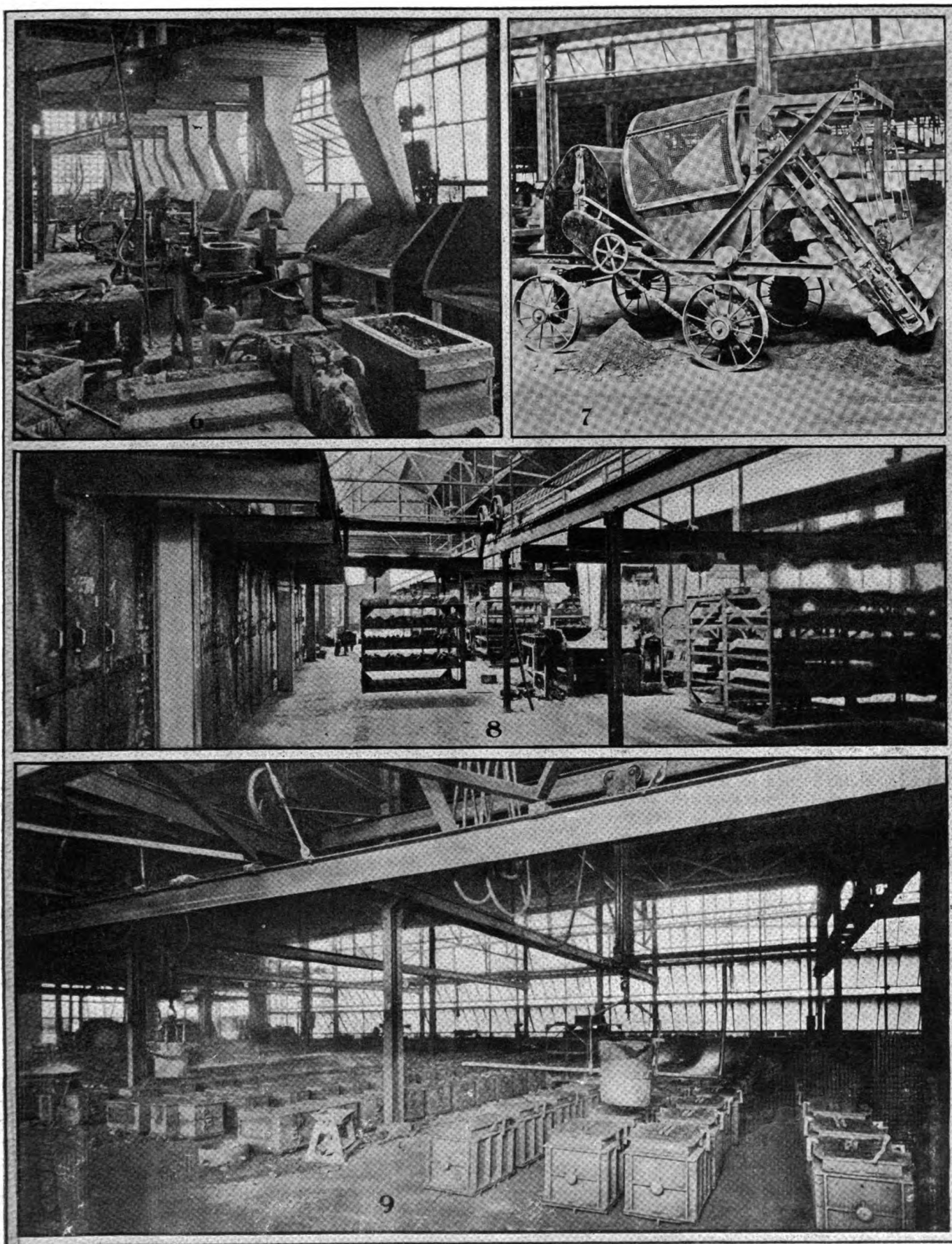


Fig. 6—Core-makers' benches, showing how sand is dumped on each bench by means of overhead distributing system. Fig. 7—Specially designed sand mixer for reclaiming sand once used in molds. Fig. 8—Cores being carried on core rack attached to overhead monorail system. The springs by which the racks are suspended eliminate shocks and jars which might break the cores. Fig. 9—Pouring is handled by means of the overhead monorail system, thus making for both efficiency and safety

Consider Well the Dealers' Meeting

The passing of Christmas always brings the dealers' meeting. This year, the meeting is intensely important. So we offer some unsolicited advice on how to conduct this vital event, based on nerve trying experiences.

By Clyde Jennings

THE season is almost here when the names of the president, vice-president, secretary, treasurer and perhaps, some other factory officials, will be placed on an ornamented program, with the sales manager as toastmaster, as speakers for the dealers' dinner. At least for a meeting of the dealers, if a dinner is not contemplated.

Now in arranging this program, if one can judge the future season by those that are history, no one will have the least concern as to whether any of these officials can speak, or whether they have anything to say. They are officers of the company and are entitled to say their piece; or as it is sometimes put—it is their duty to say a piece. Often this piece was written by the advertising man. If the officials had stuck to that piece, it would not have been so bad—but why continue this unpleasant memory?

As to all of this the writer has just one word to say:

DON'T.

The writer and his editorial associates have probably attended as many dealers' meetings as any similar group of men. In other words, they have been fully bored as often as any equal number of men with the interests of the automotive industry at heart. They have as much at stake in these meetings as any others present—for all who attend usually have staked their hopes of the future on the success of the automotive industry and the selling of vehicles is one of the vital functions. So at least we are interested in the success of these meetings. We hope that we are entirely impartial as to dealers' meetings, as regards this car or truck and that car or truck, but we are not disinterested.

The writer has attended some very excellent dealers' meetings and he has followed the results of these meetings and has been pleased to know that they did bring results.

Also he has followed the results of some other meetings—which were about as interesting as the recitation of an advanced class in a dead language—and has heard the sales manager confess that "Not a damned thing happened after it." In one case the sales manager was mistaken, for he lost several good dealers.

If there ever was a holiday season that should be followed by instructive and helpful dealers' meetings, this is the year. With that in mind, here are a few suggestions that may be constructive.

In the main, the best dealers' meetings the writer has attended have been presided over by a professional toastmaster. There are a few company officials in our industry who are entirely capable of presiding at a meeting—but we have not met many of them. Where a company has such a man, he should be used by all means. If the company has no such a man, by all means hire one.

Next, be very sure what each speaker is going to say

and how he is going to say it. Dress rehearsals are imperative. If an official has nothing to say, keep him off the program. If an official cannot say what he should say in a pleasing and impressive manner, leave him off the program.

There is no more tiresome performance on earth than to hear a company treasurer droll over the finances of a company in a manner that only bankers could understand. Besides, the dealers have financial troubles of their own. If the treasurer cannot offer to them some suggestions as to the solution of their troubles, why bother them with figures that are larger than any they ever think of in private life? Never forget that you are conducting a dealers' meeting.

We repeat: If there ever was a year when dealers' meetings were important, this is the year. The sellers' market of the last few years is gone. Frankly, for the good of the industry, we hope that it never will return. It produced too many careless features in manufacture. But we must get back to the dealers.

Whatever else you may do, do not growl and scold at your dealers this year. If you do that you are going to lose some of your best ones. Dealers are expecting constructive work this year. They probably have staked their all on the hope of selling your cars next season. They want to know the very best points of the car they are going to sell, why you made the car exactly as you did, some suggestions as to financing, how much credit help you are going to extend, what the production will be and just how it will be distributed, what the advertising plans are, if you will ship promptly the parts they order and dozens of other things of this kind.

They do not want threats, nor do they want to be scolded. They have given to you their best—according to their light and encouragement—in the past and they will continue to do so in the future if you will give to them your best. Any trade of this sort must be mutual. A dealer organization must be co-operative if it is successful. A large share of the co-operation must come from the factory.

The writer heard an advertising manager talk of dealers the other day and he referred to them almost constantly as "the poor boobs." That man's work is doomed to fail. He has not the basic idea of merchandising. He thinks all of the selling knowledge in his organization is wrapped up in his overcoat. And he never sold a car in his life.

There was a time when cocktails made a success of dealers' meetings. But that time is past. There can be no artificial inspiration at a dealers' meeting this year. The cocktail as a merchandiser is among those absent now. If you want to give any dealer a drink, do it after the meeting and in private. Do not convict your organization of being a lawbreaker in public.

Perhaps You Are Interested in Foreign Trade

If you happen to be, you will likely find something of interest in these pages. The topics concern motor cars, trucks and tractors and laws, prospects and expositions in all parts of the world.

THE extent of the automotive business in East India is strikingly shown in two recent quotations from the Bureau of Foreign Commerce. The first of these relates to British India and shows that during August 1165 motor cars were imported, of which 916 came from the United States, 139 from Great Britain and 32 from Canada. During the five months ending in August, the imports were 6457 cars valued at \$8,174,880, as against 2066, valued at \$1,881,520, during the corresponding period of 1919. Of the 1920 cars, the United States supplied 4931, Great Britain 755, Canada 542, Italy 42, France 25 and 162 not specified. Bombay imported 2408, Bengal 2226, Madras 844, Karachi 496 and Burma 483. The figures were supplied by Consul Richardson of Karachi.

The second item quotes Consul MacVitty of Saigon, French Indo-China, as saying that territory has the best roads in all of Asia. At present, the Consul states, there are about 5500 miles of excellent roads and an additional 2000 miles are expected to be constructed within the next four years.

"Such conditions present an excellent field for motor cars, motor trucks and motorcycles," he writes. "American makes predominate, although the import duty at present prevailing is high and cars of French manufacture are admitted free of duty. Local opposition to this duty is strong, many urging that it be abolished."

In India

NARANDAS V. DOSSA of Bombay writes, under date of Oct. 22:

"At present the Indian market is flooded with motor cars of all makes of all countries. There is a shortage of gasoline in Bombay and keen competition for selling the stocks of cars on hand, the result being depression; till the present stocks are materially reduced orders will be very scarce. I fear these conditions will last for about six months before any large orders from India can be put into the hands of the manufacturers."

Foreign Expositions

PLANS have been got under way for the celebration in 1922 of the centenary of Brazilian independence, and during July and August of that year an international exhibition and agricultural show will be held in Rio de Janeiro. Arrangements are being made, it is reported from Brazil, for a repetition of the exhibition at Sao Paulo. Although the date is rather far advanced, it should be placed in the "future book" of all American automotive exporters.

An international exposition, one section of which will be devoted to automotive products and aviation, is being planned in Buenos Aires early in 1922. The information reaching the United States is to the effect that a commit-

tee has been appointed to investigate the plan and that this committee now is seeking the support of the Argentine Government and the municipality of Buenos Aires. Five pavilions are to be built, according to the present plans. Three of them will be devoted to products of the Argentine, or other South American countries and of the world, one building being given over for exhibits under each of those categories. The fourth pavilion will be given over to the aviation and automotive industries, while the fifth will house machinery of all kinds.

Numerous exhibitions of interest to automotive exporters and manufacturers will be held throughout the world during the first half of 1921. Among those already scheduled are the following: Ceylon Motor Show, Colombo, opening Jan. 22; Delhi Motor Show, Delhi, India, opening Feb. 7; the Peking Industrial Exhibition, Peking, China, March, 1921; Brussels Commercial Fair, an international showing, April 4-20, and the Lima Centenary Celebration, which will include an international trade exhibition, Lima, Peru, June-October. A recent report from Lima stated that American Government representatives had taken options on 10,000 sq. ft. of space in the exhibit halls.

Witwatersrand Agricultural Show, including automotive and machinery sections, South Africa, March 23-28, 1921; Algiers Agricultural Show, date not fixed (apply to M. Celestin Granier, Commissaire General, 4 Rue Marechal Bosquet, Algiers), and the East Indian Fair, Sept. 19-Oct. 9 (apply to Fair Authorities, Menadostraat, Bandoeng, Java, Netherlands East Indies).

Southern South America

THE increasing use of the automobile in the southernmost parts of South America is revealed in a recent letter from Punta Arenas, Chile, on the Straits of Magellan. This city, which is the capital of the territory of Magallanes, is about 1450 miles south of Valparaiso, Chile, and almost as far from Buenos Aires. The territory is little developed, its chief products being sheep, fur, skins, wool, whale products and coal. The temperature there averages some 43 deg. Fahr. and almost half of the days are usually rainy.

Nevertheless, the estimate was made that there are "over 1000 automobiles in Magallanes and Patagonia. The roads are very poor, the distances are very long, but the automobile is almost the only means of transportation."

In Tientsin

AN estimate of the motor population of the Tientsin, China, consular district places the number of cars at 1500 to 2000, motor trucks at 60 and motorcycles at 75. These figures were supplied to the Bureau of Foreign and Domestic Commerce by the American consul general at Tientsin.



The FORUM



An American's View of the Olympia Show

Editor AUTOMOTIVE INDUSTRIES:

One cannot help being impressed with the immensity of the exhibition staged by the S. M. M. T. It was certainly the most truly international motor show ever staged in any country, and in floor space and in number of beautifully finished chassis and cars our own annual shows look rather commonplace.

But on analyzing the types of car shown and the price tags, one asks, Where do they expect to sell the products? for most of the English and Continental cars are restricted by design to use in countries or sections with good roads. The United States is certainly a very limited market, principally on account of price. While there is a small field for the imported car de luxe in the United States, a discriminating buyer will find several of our own high class cars much better value for the money.

A general survey of the show makes one feel that many of the designers imagine they are still working for the Government on war work, and elaborate design and indifference to cost of materials and production are frequently quite apparent. In the case of the high priced de luxe cars, such elaborateness of design is justified, as the makers are catering to a class who want a beautiful piece of mechanism, and are willing to pay the price. But many designers in attempting to produce smaller cars for mass production have simply made miniature copies of the larger cars and do not seem to realize that lower selling price means a different treatment in design. In this price class, one sees very elaborate aluminum castings embodying engine bonnet rear support (or "dashboard"), toeboards and extended instrument board, to which the steering post is supported. This construction makes a nice looking job, and its cost and weight are justified in cases where custom made bodies are fitted, but in cars where the chassis factory mounts the body, experience has shown that a sturdier construction, with less weight, cost, and tendency to rattle, is obtained with all of this mounting integral with the body cowl.

The foreign designer also increased the cost in blindly following his ideals of thoroughness by using alloy steels in many places where necessary requirements of rigidity or adequate bearing surfaces and fits automatically demand such largeness of size that good carbon steel is never stressed anywhere near its elastic limit, and fatigue is a very remote possibility. Much wasted material and slower production were caused during the war by designers ignoring this practical fact.

The English small car—and by this term I mean the 10-12 hp. car in production by so many manufacturers, and not the cycle car or two-seater—has a longer wheelbase than the American car of the same passenger capacity. Some of this greater length of wheelbase seems wasted, as they frequently locate their pedals very far back of the rear cylinders, and this condition is what determines the position of the front seat. There is no question, however, that the English and Continental car bodies have lower

seats than the American cars, which arrangement, of course, requires more leg room. The good roads abroad make possible this lower seating, but body builders in the States find that many people object to the greater effort required in rising from a low seat. The American manufacturer, for quantity production, has to adopt a compromise which will find favor with the greatest number of people, and makes his seats from an inch to two inches higher and a little straighter back than the foreign body designer. This compromise results in decreased wheelbase, which in turn results in less weight and lower cost of the complete car. We have only to compare the Franklin six-cylinder car of 115 in. wheelbase with the Austin four-cylinder "twenty" of 129 in. wheelbase, both seating five passengers, to feel convinced that it is possible by skillful design and distribution of car elements to save several inches of wheelbase, and still obtain very satisfactory seating comfort. The Austin twenty is cited as it is a typical British car, and one of the few and notably successful attempts at designing a five-seater which would satisfy the English and Colonial users in the largest numbers, competing with American cars of similar characteristics, and create a market which would enable it to be put in quantity production so as to get the selling price down to what is a medium price this year—£695—including body and everything now considered as standard equipment on an American car. One has but to compare this car and its price with two American cars of about the same size engine and seating capacity—the Hupmobile selling at £750 and the Dodge at \$610—to realize that in this field the English have a competitive car for the English market, which is protected at present by an import duty of 33.1-3 per cent on cost plus freight, and by the rate of exchange.

Two outstanding impressions received by an observer are:

First.—The presentation of so many de luxe cars, some of these entirely new designs, others refinements and elaborations of previous models.

Second.—The struggle by the British manufacturers to get out new models in which low first cost and economy of operation, especially as regards gasoline consumption, have been the object in mind.

In regard to the first item, as the chassis price of £2,000 or more would indicate, in designing and preparing the car for the market no serious regard has been paid to cost of production, as long as the designer's object has been obtained. The Rolls-Royce, pioneer in this class, looks rather crude and trappy compared to some of its more recently designed and cleaner cut competitors. Some typical features of design in this class are as follows:

Aluminum cylinders with steel liners, and other characteristics of airplane engines.

Overhead cam shafts. (The eight cylinder Leyland designers evidently realize the difficulty of getting quiet operation with overhead cam shafts and drive same with a unique system of triple eccentrics on both cam shaft and lower driving shaft connected by long coupling rods.)

Four wheel braking systems, some operated pneumatically.

Anti-rolling or torsional equalizers, supposed to check the roll or sway of the body.

Cantilever springs with ends supported on roller slides. Wheelbases from 144 to 150 in.

In respect to the second outstanding impression, there appears a sort of standardized belief in the minds of numerous foreign manufacturers that from ten to twelve horsepower is the right size engine to get the maximum of performance with minimum expenditure of fuel to transport four people (in some cases five), and there has been more effort expended by designers and manufacturers to present cars in this class than any other. The engines in these cars have only about one-half the piston displacement of a Ford engine, a wheelbase about the same as a Ford car, a track averaging about 48 inches, tires about 28 x 3½ in., and a weight only slightly less than the Ford car, but the cost is considerably more, ranging from £450 to \$600. These cars are supposed to average about 40 miles to the gallon and even a great deal more on special tests. Aside from good, modern, clean cut design and practice, and good workmanship, there is nothing radically new or novel about these small cars to account for any better economy of operation than American cars in proportion to size. It is simply a case of small engines in light weight cars on good roads. One must also realize that the English gallon is one-fifth larger than the U. S. gallon. Higher gear ratios in the rear axles are generally used and are practicable on account of the good roads. This fact helps in keeping down gas consumption. Some justification for the seemingly high price for such a small car is seen when one considers that the body, although seldom holding more than four people, is better made and finished throughout than that of the small American car, all metal fittings, including windshield uprights and framing, being nickel plated. Leather upholstery is the rule, and the painting is generally done in colors.

Some of the miscellaneous impressions received during inspection of cars on exhibition are as follows:

The disk wheel is used on a great number of cars of all classes and, in the judgment of the writer, will be used very largely in the future in this country.

Even on the expensive closed cars, straps are mostly used for raising the windows, and very few mechanical window lifts are employed. The explanation given was that the latter are not reliable enough.

The electric wiring is generally first class, both as regards planning and workmanship.

There is an increasing number of makers using sleeve valve engines.

For use with removable cylinder heads there has been developed a method of sealing the water passages between cylinder block and head by rubber gaskets, so that the copper-asbestos gasket has nothing to do but hold compression.

There were several instances of battery ignition installed on new models by English and European manufacturers, so that it is quite evident that the decided prejudice in the minds of foreign manufacturers against the use of anything but magneto ignition has begun to disappear.

J. G. PERRIN.

Front Wheel Drives

Editor AUTOMOTIVE INDUSTRIES:

In your issue of Oct. 7 we noticed an article on the use of the front wheel drive on automobiles, in which you recommend its use in connection with double deck motor buses.

As you know, the Latil line, which we manufacture, consists of four wheel drive tractors and front wheel drive trucks.

In addition to the special use that you mention, there are others which are particularly interesting for this type of vehicle, among which we may mention motor trucks for the transport of racing horses, garbage trucks for municipal work, delivery trucks for department stores, and moving vans.

The difficulty, as you have so well explained, consists in finding the right way to build wheels that are at the same time used for steering and driving. Our Latil system of front wheel steering and driving has been in use for the past ten years.

CHAS. BLUM & CIE.

Wheel Wobble and Tire Wear

Editor AUTOMOTIVE INDUSTRIES:

"The Forum" for Nov. 4 takes up the matter of tire wear as related to wheel wobble and faulty wheel alignment. It seems to the writer that the relation of wobbling wheels to tread wear is a generally accepted error which the trade press seems anxious to perpetuate.

I should like to lay down the proposition that the only thing which can cause side slip of the tire on the ground, and, consequently, tread wear, is an angle between the true axes of rotation of the two wheels on the same axle. This applies to front and rear wheels alike so long as the vehicle is moving straight ahead, and disregarding the slight correction for camber.

Inasmuch as the true axis of rotation cannot be changed except by change in position of the bearings in which or on which the axle shaft or wheel turns, it is apparent that rear wheels cannot be made to side slip except by distortion of the axle housing. The bending of a semi-floating rear axle shaft or distortion of wheel rim or tire does not affect the alignment of the bearings and, consequently, cannot produce side slip.

Observation of a rolling cookie cutter will give visible proof that even a greatly exaggerated wobble does not cause slippage.

W. B. JONES.

Book Review

THE GASOLINE AUTOMOBILE, its design and construction, Vol. II, by P. M. Heldt. This is the fourth edition of Vol. II of Mr. Heldt's series covering the design and construction of automobiles. Vol. II deals with the transmission, running gear and control, and includes the theoretical and empirical considerations of design for practically all of the chassis but the engine. Those who are familiar with the second and third editions of this work will find in the present edition about thirty pages of tabular and other matter which has been added to the appendix for reference work, and in addition, the text has been thoroughly revised and brought up to date.

The work is noteworthy for its thoroughness and covers every phase of chassis layout necessary for the design and installation of the clutch, transmission gearset, propulsive unit, axles, brakes, control and suspension.—J. Edward Schipper.

THE Federal Power Commission in a recent statement says: "The urgent need for enactment of adequate legislation respecting the use of water power on the public lands and the navigable rivers of the United States, which was met by the passage of the Federal Water Power Act during the past session of the present Congress, is shown by the extent to which advantage has been taken of its provisions. One hundred and thirteen applications for a permit or license for power development have been filed with the Commission."

Methods of Making Wage Adjustments Need Careful Study

When the cost of living has definitely decreased wage reductions are bound to come. Trouble will ensue if manufacturers take advantage of the situation and reduce them arbitrarily and without discussion. The cost per piece of labor is more important than wage rate levels.

By Harry Tipper

THE question of wages, wage rates and the methods to be adopted in adjusting these wages to the new market conditions is a very pertinent one for many manufacturers at the present time, and the discussions of it are very interesting in their variation of analysis and the examination of the factors which they consider. In this connection Don F. Kennedy has written an article in the *Iron Age* a portion of which, worth quoting for its suggestion in connection with the matter, follows:

There are those who are heard to say that the workman was blind who could not see ahead what was coming, and lay up a savings account to tide over such periods. They assume to give the workman more intelligence than many a corporation which invested its high profits of the past few years in factory extensions and new machinery to pyramid these profits, and which now finds itself possessed of an enormous plant and corresponding overhead charges, but with no working capital with which to finance it. A certain man whom many of us know by hearsay, but fewer by actual acquaintance, one Adam Smith, pointed out 150 years ago a fundamental truth that is overlooked in such discussions; that a workman by the very nature of things is a man without the means to support himself over any lengthy period. When the more intelligent or more diligent workman has succeeded after some years of toil in laying up a sum of money he sets up in a small business of his own with his accumulated wealth, and behold! he is no longer a workman, but an employer, even though he may employ at first only one or two men.

But in figuring whether or when wages should be decreased, several items require consideration.

The head of a large automobile company said recently that he had taken some pains to find out the results of the requests of his purchasing department to its sources of supply for reduced prices to compensate for the reduction in the price of his car forced on him by the refusal of the public to buy at the old figures. He said that one of two answers was invariably given. Either the reduction was granted, or the plea was made that materials remained as high as ever, wages remained the same, and consequently no concession could possibly be made. Never was a word said about a reduction of profits! This alternative never seemed to have entered their minds. This man said that they themselves had taken a large cut out of the profit part of the selling price of the car when reduced prices were decided on.

Two women in a mid-western city this fall had occasion to have their fur coats repaired and remodelled. The

coats were nearly identical, and the work required was about the same. One took hers to the leading fur store of the city and left it there. The other hunted up a smaller shop on one of the less important streets some little distance out. Her coat was done first, and it so happened that they both went together when the coat was ready. While in this shop the first woman saw a coat hanging up which looked so much like her own that she examined it closely, and to her surprise found that it was her own that had been sent to this place to have the actual work done. Comparing prices, she found that she was paying the large store, which was filling the newspapers full of advertisements of furs and work at enormous reductions, a clear profit of \$400 for handling the transaction! A large department store in this same city last week experienced the poorest day's business in the history of the institution. The manager was severely taking to task the saleswomen for not selling more goods. He said that prices had been reduced on everything, and that the girls should make more sales. The head saleswoman of one department replied, "The people will not buy, and we cannot make them. After the exorbitant profits you have been making in this department for the past three years you should be content to operate at cost or a little less for a time."

In deciding where reduced cost of operation should begin, profits ought to be the first item scanned. In considering the item of wages, it should be kept in mind that the chief components of the cost of existence of the ordinary person are still nearly at the top. Retail prices of the daily necessities have not yet been forced much below their highest levels. Taking advantage of the country-wide shortage of houses, rents have been criminally increased. Jumps of \$10 and \$20 and \$40 a month have been made time and time again—with no alternative but to pay. Rents have not been reduced. The householder who listened to the advice of his Chamber of Commerce and others to whom he would naturally listen for counsel filled his cellar with coal for the winter, and now finds that he paid peak prices. This important part of his budget is settled for him for this year. Retail prices of food have dropped less than 3 per cent. Much noise is being made in the public prints of reductions of a cent or two in bread, but this means but 10 or 15 cents a week to the average family. Clothing has dropped greatly, but in times like these workmen out of a job or working part time are not buying new clothes.

In brief, the cost of existence of the laboring man is still at its highest point to all practical purposes. When retail living costs, of which the major items are rent, food, heat, light and clothing, come down,

then it will be in order to reduce wages accordingly. When such action does become necessary, go to the workman frankly and honestly, and he will receive you in the same spirit.

It will be noted that Mr. Kennedy has referred to the fact that the increase in wages to the worker did not occur automatically as the cost of living rose, but occurred only under the stress of labor shortage, sometimes many months after the disturbance in the buying power of the workers' income had begun. In some cases the increase in wages did not catch up with the increase in living expense at any time. This was the case with some of the classes of workers in the mines, on the railroads and in some of the general distributing lines of business. These things are fairly well known and the worker is not sufficiently blind or unintelligent to be completely ignorant of them.

Mr. Kennedy, however, has left out one of the most important factors in connection with the matter and that is the increase of the individual efficiency of the worker in many lines of industry. Reports from industrial centers continually refer to the fact that with a 25 per cent cut or something of that kind, the production has not been materially decreased. This, of course, means that the labor cost per unit has gone down to that extent and the wage rate is not indicative of the labor cost.

The worker is expecting some reduction in his wages. He knows from past experience that a slackening of industrial effort and consequent unemployment means a reduction in his earnings. He is not going to be very much disturbed by a reasonable reduction which is justified to him by the frank and open method of its adoption.

He is thoroughly aware, however, of the fact that many industries increase their profits at a much more rapid pace than his wages increased, he knows that his wages did not increase as fast as the cost of living increased, and he knows that the cost of living has not decreased to him as rapidly as the price of the manufacturer's product has changed.

The arbitrary attempt which is being made by a number of factories to reduce the wages of their employees without regard to the variation in the cost and the relation of that reduction to the cost, will serve to confirm the opinion existing upon all sides that the present wage systems are not determined upon any basis of co-operation or values, but only upon the advantage or disadvantage of the manufacturer in the labor market.

We have almost succeeded in exploding the commodity theory of labor, and we have begun to study the efficiency of labor as a human matter and a matter of human interest, conduct and behavior. We shall not get very far in this period if we proceed to take full advantage of the reversal in the situation, and arbitrarily reduce the wages of the workers without explanation or discussion and without any relation to the cost or the profits. Even if we feel that we are fighting labor, we should fight clean, with open weapons, and some decent rules of conflict.

These call for a reasonable study of the variation in the cost of labor per unit of our production, brought about by the increased efficiency of the labor itself. We must examine the effect which such a reduction would have upon the buying power of the worker in relation to his costs of living, not to the prices which are presently being secured by the manufacturers. We should study the matter from the standpoint of the workers' expectations and reactions so that our conclusions may be fair and seasonable.

In any case, the important matter is not the general change in the level of wage rates, it is the cost per piece of the labor expended upon that work. It might be well to consider how much of the full efficiency of labor we are securing, how much can be secured further by proper methods of organization and how much these improvements would be retarded by changes in wage levels, and whether a reduction in the wage rate will result in a reduced cost per piece or not.

We are still inclined to look at the rate of wages as the governing element in the cost of labor per piece when, as a matter of experience, the relation between rate and the cost is not by any means exact.

Reductions are bound to come. The consideration of these reductions can be conducted in such a way as to indicate a spirit of fairness which will go far to solve the present problem and lay the basis for the solution of future problems of a like character.

It is possible to approach the reduction in a way which will discourage suspicion and indicate a fair degree of justice in the method of tackling the problem. What we finally desire is a reduction in the unit cost per operation per piece, and any changes in the wage schedule should be so determined that they will have that effect and not merely reduce the wage scale.

The American Tractor in Italy

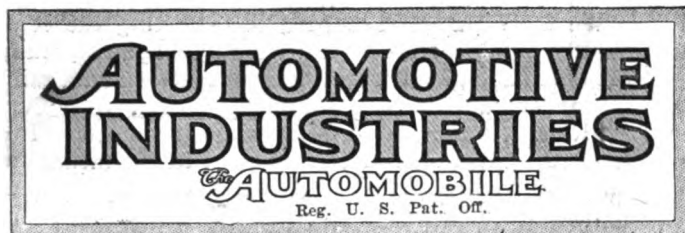
AN interesting note on the use of American tractors in Italy is found in a recent report Alfred P. Dennis, Commercial Attache of the American Consulate in Rome. His comment follows:

"One hears no word of criticism of American tractors in action; they give satisfaction when properly handled. Unfortunately, the American machines have been very badly handled since the outbreak of the war. The Italian Government purchased 6,500 American farm tractors during the war and put them to work in various parts of the country. It was thought that these machines could to some extent take the place of the thousands of farm laborers called to the colors. The Government-owned tractors were operated by soldiers. They would go from village to village, field to field, plowing the soil where their services were needed. Many of these men had no

skill or experience as mechanics. As a consequence, the machines were not properly handled.

"With the return of peace conditions the Government began to sell farm tractors to the farmer under a liberal credit arrangement. All but 2,000 of the original 6,500 have now been disposed of and are being operated by individual owners. The Government has set up at Campannelle shops for the repair of tractors, but the work is proceeding slowly. Some of the machines are in such bad condition that they are virtually being scrapped to provide substitute parts for the units that are being overhauled.

"The point should be emphasized that no American tractor can hold its own in the Italian market without a local service station equipped for instructing operators and for supplying spare parts for repairs."



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Greetings !

AT this season of good fellowship, the staff of AUTOMOTIVE INDUSTRIES wishes to be included among those who extend to you all the greetings of the season and the best hopes for next year. We wish that it were possible for each of us to have personal contact with all of our readers, that we might profit thereby and better understand each other.

This is not a mere formal thought prompted by the sentiment of the season. We honestly believe that the readers of our paper are men of such caliber that one cannot come into intimate contact with them without carrying away some betterment for himself.

The year that is drawing to a close has been one of surprises. It did not carry to its end the rosy prospect that all of us saw at the beginning. Few of us were true enough prophets to foresee, at the Christmas season a year ago, exactly what the coming year would bring forth. There are some who believe that the dark days of the year 1920 were needed—that they will in the end produce a wholesome effect upon the industry. If lessons were merited in the last year, we hope their teaching will not soon be forgotten.

There was a period during this year when many in the automotive field felt that our industry was the "goat" of the credit system. To any person who still holds that there was unjust discrimination we suggest a few hours' reading of papers devoted to other industrial activities. This will convince the most skeptical that the sackcloth and ashes have been well distributed and perhaps remove any bitterness that remains in the memory.

We believe that the sky is clearing, that better days are dawning and that with the New Year will come more to encourage than was believed possible a few weeks ago. With this in mind let us take advantage of this season of humanity, forget the trifling wrongs of the past and go forward, each feeling a bit closer to his fellow man and resolved to place his standard of business for 1921 on a higher plane. Humanity and justice should be woven closely into the fabric of a successful industry.

May you carry with you throughout the new year the Christmas spirit! Then we know that you will be happy and prosperous.

The Winter Top Increasingly Popular

THE winter top seems certain to see wider popularity and consequently more frequent use as its advantages become more generally appreciated. It will not, of course, displace the closed type of body, yet it possesses most of the same advantages and has besides peculiar advantages of its own. The weight of the top plus that of the touring car or runabout body is much less than that of the corresponding closed body, and the same is true of the cost. Furthermore, the winter top can be and usually is so constructed as to be easily converted into an open type, which many prefer for use in warm weather.

Until recently, however, the winter top has been more or less of a makeshift or has not been given the care in design and finish it required to become really popular.

The winter top can and should be made smart in appearance and in keeping with body lines, not a makeshift simply set on the body as a protection from the weather without regard to looks. When intelligently made, it greatly increases the utility of the car and consequently becomes a genuine sales asset.

The closed body car is beyond the reach of many buyers who would unquestionably pay the slight additional cost of a well designed and well made winter top over that of the top commonly furnished, especially if the car manufacturer will see that details of interior trim, finish and appointments are in keeping with what the car becomes when so equipped—a modified closed car suitable for use as an open type.

Trimnings and even seat arrangement may well vary from those of the touring car, resembling so far as practicable those of a sedan body while still suitable for use when the body is opened.

Such a car, fitted if possible with a heater, becomes a year-round family car which should find a ready market among discriminating purchasers.

Better Body Construction Needed

THE article by our British correspondent, which appears on another page, severely criticises the bodywork on American cars and is worthy of careful consideration by our car manufacturers regardless of whether they sell in the British market. After making due allowance for the natural difference in viewpoint as between the American and British uses, there is ground for the criticism made, as is evidenced by the data submitted. Similar criticism has frequently been voiced by discriminating buyers in this country. Faults of the character indicated may be tolerated by impatient buyers when demand exceeds supply, but they reflect no credit upon the manufacturer and certainly detract from the salability of the car and the satisfaction of the user. Consequently, they should be remedied, especially at this time, when business is dull and the wise builder is losing no opportunity to improve his product. Those who are competing in European markets, in particular, cannot afford to overlook or fail to heed such obviously constructive criticism.

It has long been said that the passenger sits on rather than in the American car. Improvement in this particular, as well as in the proper sloping of cushions, has been made in some domestic cars and might well be made in all.

It is a well recognized fact that attractive body lines and appointments are a sales asset not to be overlooked. Opinion as to what constitutes good body lines is bound to differ with varying tastes, but there is no excuse for carelessness in finish and fitting, or for failure to provide for the comfort of both driver and passenger. There is, for example, no real occasion for badly fitted doors and hoods, for unfinished hardware, carelessly attached, or for windshields not in keeping as to design and finish with the body or other appointments. We are accustomed to work to thousandths of an inch in mechanical parts, yet in a body operation such as fitting a door, a gap of over a quarter inch is expected to pass inspection! However well built, our chassis do not, in the average case, compare favorably in appearance with the European chassis, and this is even more true of the body and its fittings. Here there is much room for improvement.

Our correspondent says the British purchaser would prefer to pay ten per cent more for his car than have to apologize for its appearance. The same is true, we think, of discriminating purchasers in this country, but we believe the desired result can be accomplished with but little if any increase in cost. A little more intelligent forethought in design combined with the same care in production, finish and inspection that are given mechanical parts in well run plants to-day, and the ground for criticism will disappear.

We suspect that the basic cause for faulty design, construction and finish of bodies to-day is the lack of thoroughgoing engineering work and the survival of obsolete methods (or in the lack of method) in the body department. Supply the equivalent highly trained organization to produce bodies that now produce chassis and the result will be identical.

In some cases where the cost of the chassis is pretty well fixed, the temptation—and, we fear, the practice—is to cut the cost of the body in order to sell at a certain fixed price. This is a serious mistake and one bound to react on the manufacturer.

There are six steps in the production of a satisfactory body:

First, a design which is pleasing to the eye and incorporates the features and dimensions essential to comfort. Second, the construction and service test of samples, using various finishing materials if possible. Third, the selection of materials and fittings consistent with the results of the tests employed, and of the best possible quality within the allowable price range. Fourth, the adaptation of the design to quantity production, without changing its characteristic appearance unless absolutely necessary for economy and then only in collaboration with the designer. Fifth, the manufacture of the component parts and their careful assembly into the body. Sixth, the assembly of the body on the chassis and the final finishing.

The fifth and sixth steps must, if the desired result is to be obtained, be carried out under rigid inspection to see that details of finish and fit are held to proper specifications and tolerances.

Each step must be correlated with the others, and, of course, the steps will overlap to some extent, but the omission of any step or its indifferent execution will lead toward the unsatisfactory state of affairs that has given rise to the criticism cited.

N.A.C.C. Concentrates on Show Plans

Invitations Sent to 30,000 Dealers

Utility Advertising Campaign Ready to Start—No Space for Foreign Cars

NEW YORK, Dec. 21.—The machinery of the National Automobile Chamber of Commerce which will operate the annual New York show beginning Jan. 8 is running smoothly. The chief complaint is lack of space to take care of would-be exhibitors. While Sam Miles, the show manager, is not given to predictions, he admits there is every reason to believe the exposition this year will be the most successful as well as the most important ever held.

Invitations have been sent to 30,000 automobile dealers in every part of the country, and while it is not expected all of them will be at the show, those who do not attend will make themselves conspicuous. Manufacturing companies are making unusual efforts to get their dealers to the exhibit and will look after their comfort while they are here. All the larger companies will have dinners for their sales forces at which efforts will be made to inspire them with the realization that the business tide is turning.

Preparations have been completed by the National Automobile Chamber of Commerce for the launching of the extensive campaign which it will conduct in New York and Chicago simultaneously with the shows to prove that motor vehicles are an essential part of the transportation system of the United States. The dealers themselves are enthusiastic over the possibilities of this means of convincing bankers and business men that the motor car is not a luxury to be classed with face powder and perfume.

Cities Pool Advertising Funds

The dealers' association in Chicago has made an appropriation of \$10,000 which will be added to the N. A. C. C. fund for that city. The Newark, N. J., dealers also have pooled their funds with the N. A. C. C. The New York dealers will carry on an advertising campaign of their own to supplement that of the chamber. This advertising will start Wednesday of the week before the shows. A synopsis of material to be used in the newspaper displays will be sent to all dealers in the country.

The Motor and Accessory Manufacturers' Association has joined with the N. A. C. C. in a determined effort to prevent profiteering by the hotels during the show, and their efforts have been even more successful than had been expected.

PUBLIC WORK KEYNOTE OF SHOW ADVERTISING

NEW YORK, Dec. 21.—Here is the keynote which will be sounded in the advertising campaign to be conducted by the National Automobile Chamber of Commerce in connection with the New York and Chicago shows:

America this year must spend ten billion dollars for public work.

Railroads will be rebuilt. Highways will be improved and extended.

Thousands of school buildings must be erected. There is a shortage of hotels, houses, hospitals, etc.

These works have been neglected for three years. There can be no delay in starting.

Money, labor and materials are ready.

Prosperity is certain.

Without automobiles the work cannot be done.

A million cars are required for replacements alone.

Every large hotel in New York with one exception has agreed to maintain its regular rates.

Preparations for the chief events of the week supplemental to the show are well under way. These events include four important dinners. They are:

Rubber Association of America, at the Waldorf, Monday evening.

National Automobile Chamber of Commerce, Commodore, Tuesday evening.

Motor and Accessory Manufacturers Association, at the Commodore, Wednesday evening.

Society of Automotive Engineers, at the Astor, Thursday evening.

Truck Committee To Meet

The motor truck committee of the National Automobile Chamber of Commerce will hold one of the most important meetings of its history Wednesday and the directors of the Chamber will meet Thursday. The annual meeting of the Rubber Association will be held Jan. 10, and important conferences of the Motor and Accessory Manufacturers' Association directors will be held in the week.

While no foreign made cars will be exhibited at the show, many European manufacturers will attend the exposition. It is understood that included in the number will be Sir Herbert Austin, who will not only visit the show but will have supervision over a display of several Austin cars at the Waldorf. Applications for space were received from four British manufacturers, one French, one German and one Swiss.

Vehicle Law Ready for State Action

Motor Vehicle Conference Committee to Send Copies to All Legislatures

NEW YORK, Dec. 18.—A new edition of the "Proposed Uniform Vehicle Law," drafted by a joint committee representing the National Automobile Chamber of Commerce, the American Automobile Association, the Rubber Association of America, National Automobile Chamber of Commerce, the Motor and Accessories Association and the Trailer Manufacturers' Association of America, is just off the press. A copy of this important volume will be placed in the hands of each member of the forty-two State legislatures that meet early next year.

Within the last few days copies have been distributed of the "Proposed Uniform Vehicle Law" drafted by a committee named by the International Traffic Officers' Association. This law was reported to the executive committee of the Traffic Officers' Association in Cleveland, Dec. 6.

The question was there raised that this law too strongly indorsed certain signalling devices. As a result of this discussion the associations represented in the Motor Vehicle Conference Committee withdrew from the association. The draft of the proposed law now being circulated was never indorsed.

SPAIN INCREASES DUTIES

PARIS, DEC. 5 (*Special Correspondence*)—Spain has just increased her automotive import duties. Cars with open bodies have to pay a duty of 240 pesetas per 100 kilos (220 lb.) plus a fee of 600 pesetas. With closed bodies the fee is increased to 900 pesetas. For chassis only the duty has been increased from 80 to 240 pesetas per 100 kilos, when the total weight is less than 2200 lb. Trucks and motor buses pay 60 pesetas per 100 kilos. The duty on motorcycles has increased from 3 to 9 pesetas per 100 kilos. On band tires the increase is from 1 peseta 20 to 1.80 per kilo, and on pneumatics the jump is from 2.70 to 8.10 per kilo.

FAVOR BUS AS AUXILIARY

NEW LONDON, CONN., Dec. 18.—A resolution from the Hartford Chamber of Commerce asking the Connecticut Chamber of Commerce to favor passage by the next legislature of such measures as will permit trolley companies to use auxiliary motor service, has been approved by the resolutions committee of the State body.

No Combine Found in Tire Industry

Business Is Shown Highly Competitive

Anti-trust Charges Against "Big Six" Not Substantiated Before Federal Jury

CLEVELAND, Dec. 17—After a thorough and searching investigation of charges that the so-called "Big Six" companies in the rubber tire industry had violated the Sherman Anti-Trust Law, the Federal Grand Jury of the United States District Court of this city reported to-day that no indictments had been returned.

So important was the investigation, which started here last week, that the United States Department of Justice at Washington sent Edward Gann, Roger Shale and Oliver Pugin, special assistants to United States Attorney General A. Mitchell Palmer, here to assist the local district attorney in the probe.

Joseph C. Biertenstein, first assistant United States District Attorney, of this city, who has had charge of the more important Grand Jury investigations here in the past, had charge of the probe and through him the men sent on from Washington presented their evidence to the Grand Jury. More than 100 witnesses, including men high in the counsels of the larger rubber companies, and others outside of the industry, who claimed to have facts bearing on the charge made at Washington against the "Big Six," were subpoenaed, and they testified before the Grand Jury.

The investigation extended to operation of the companies throughout the United States, and witnesses were present from all parts of the country, many coming from New York City and Akron, where three of the companies involved in the probe have their home offices.

The companies which bore the attack of the Government and which came out of it without having to stand trials and charges of violating the anti-trust law are the Goodrich, Goodyear and Firestone of Akron; the Ajax, United States and Fisk.

Investigation Details Secret

Biertenstein and others in charge of the probe refused to comment on the investigation, which was conducted with as great secrecy as possible. It was learned from other sources, however, that the Government decided to act after a communication was received at the offices of the Department of Justice in Washington, in which it was charged that the Big Six, which controls approximately 80 per cent of the rubber trade in the United States, were in a conspiracy to fix and maintain uniform

prices. Acting on this tip, it was learned that W. F. Ficklen, of the Department of Justice at Washington, gathered evidence bearing on the charge. The probe was started here because of the proximity of this city to the companies at Akron.

At the district attorney's office no information could be obtained as to what direct acts were charged against the companies, but it was learned evidence was given that the rubber trade is highly competitive, and that more than 200 companies manufacturing tires are quoting nearly 180 different prices on same sizes of tires.

Jurors Studied Conditions

It was learned that the jurors went extensively into present business conditions, and were told that on account of large overhead and small demand practically every company in operation was losing money to-day. Although it cannot be stated definitely what was in the minds of the grand jurors when they voted "no bill," it is thought that the jurors concluded that in view of present trade conditions, the evidence presented was not sufficient to warrant putting on the companies involved a new burden.

The jurors not only heard witnesses for the Government against the companies, but the executives of several of the larger rubber companies were permitted to testify. Among them were Messrs. Rutherford, vice-president of Goodrich; Rockhill, vice-president of the Goodyear, and Partridge, vice-president of the Goodyear, all of Akron.

The activities of the American Rubber Association also were delved into, and witnesses presented records that were illuminating. Messrs. Vorhis of Chicago and Christie of Des Moines, Iowa, executives of the Midwest Rubber Association, told of the work of their organization. The action of the Grand Jury ends the investigation and leaves the company free to continue business without fear of being haled into court to stand trials on criminal charges.

The position of those in charge of the investigation, it was learned from outside sources, was that a serious charge having been filed against the companies, in justice to public and to the companies concerned, a thorough investigation was imperative. The Government went vigorously after every bit of evidence available, and it all was presented to the jurors.

NEW BRITAIN CLOSES PLANT

NEW LONDON, Conn., Dec. 18—Giving the general business depression as the cause, the New Britain Machine Co., manufacturers of tractors and other machinery, normally employing about 600 hands, closed its plant yesterday, to remain idle until Jan. 3.

Advertising Methods to Meet Discussion

M. & A. M. A. Managers to Hold Important Session During National Show Week

NEW YORK, Dec. 21—"How Advertising Can Turn the Tide in the Automotive Industry," will be the key-note of an important meeting of the advertising managers council of the Motor and Accessory Manufacturers Association to be held at the Hotel Astor, Jan. 7. A large attendance is assured, since most of the advertising executives of automobile companies will be in New York for the automobile show. A comprehensive program has been arranged by the executive committee of the council.

One of the features will be an open forum discussion on "My Best Advertising Bet for 1921." This will be a brass-tacks exchange of ideas and experiences on increasing the efficiency of the advertising dollar in the face of current conditions in the industry.

"Selling the Automotive Industry to America—the Spirit of Transportation," will be the title of a paper by E. W. Clark, advertising manager of the Clark Equipment Co., Buchanan, Mich.

Alfred Reeves, general manager of the National Automobile Chamber of Commerce, will discuss "The Outlook for the Automotive Industry in 1921—Co-operation Between the Advertising Managers of the Car Manufacturers and the Parts and Unit Makers."

"A Review and Forecast of Business," with particular reference to the automotive industry, will be presented, with detailed statistical charts, by C. C. Parlin, manager of the commercial research department of the Curtis Publishing Co., Philadelphia.

A novel feature of the meeting will be an exhibit of members' advertising. The various advertising executives have been invited to mount on suitable frames specimens of their significant and particularly interesting advertising material.

HARVESTER MAINTAINS WAGES

AKRON, Dec. 20—The wages of employees of the Akron motor truck plant of the International Harvester Co. will not be reduced following decision of the works council of the factory. The eight-hour day recently adopted by the company will continue instead of a nine-hour day. The works council consists of fourteen men, seven of whom are officials and seven representing employees. Production of the company has slowed down somewhat due to the general business depression.

Overland to Avoid Heavy Production

Will Manufacture Only to Meet Sales—Edwin B. Jackson Reported Resigned

NEW YORK, Dec. 20—Production will not be resumed Jan. 3 in the plants of the Willys-Overland Co. as had been expected. When the making of cars will be undertaken again has not been determined. It can be stated that the reason for the delay is found in the condition of the market. The company does not believe the times are auspicious for the turning out of motor vehicles in large numbers, and when manufacturing is started again it will be on a scale adequate to meet actual demands and no more. As a matter of fact, this is the present policy of all the Willys' companies. Business prudence, it is felt, makes operating economy essential and the conservation of cash wise. This is demonstrated by the passing of the quarterly dividend on the preferred stock of Willys-Overland. In announcing this action the directors issued a statement in which it was said:

"Notwithstanding the preferred dividend of Willys-Overland has been earned for the full year by a very wide margin, directors consider it to the ultimate advantage of the company to conserve cash resources until normal conditions again prevail in the industrial and financial worlds.

"Until the period of readjustment in the motor industry, now in progress, has been completed and abnormal credit conditions relieved, the company will pursue a conservative manufacturing program looking toward the reduction of inventories and the establishment of the utmost manufacturing and merchandising efficiency. To that end several changes in executive personnel have been made.

"The financial position of the company has been considerably strengthened by this program. At the present time quick assets are in the ratio of approximately two to one to liabilities."

No amplification was obtainable at the office of Walter C. Chrysler of the statement that several changes in the executive personnel had been made. The most important of these, of course, was the resignation of Clarence E. Earl as first vice-president.

Reticent on Jackson Action

There have been persistent reports that Edwin B. Jackson, vice-president in charge of sales, has offered his resignation and that it has been accepted, but Chrysler said he could not discuss the subject until after Jan. 1. It is understood other important changes are contemplated, if they have not already been made.

The air has been filled of late with speculation and rumor about Willys-Overland and the whole Willys organization. Most of these reports have been entirely without foundation or the rea-

sons for steps which have been taken have been misconstrued.

It can be said on authority that Willys-Overland is not by any means in dire need of funds. All its bank loans have been renewed and no important financing will be necessary for some time to come. When this financing is undertaken it will be on a permanent rather than a temporary basis, and it is likely to include all the Willys enterprises. Some kind of security probably will be offered in the refunding operation instead of having it on a stock basis.

Liabilities Reduced \$18,000,000

Current liabilities on Nov. 30 of the Willys-Overland Co., including bank loans, accounts payable, trade acceptances and obligations to note brokers, stood at approximately \$26,750,000. This marked a reduction of about \$18,000,000 as shown by the balance sheet of April 30 last.

Willys-Overland was shown to be no worse off than many other industrial concerns that are now suffering from deflated inventories, frozen credit and the falling off in the demand for their products.

Total assets of the Willys-Overland Co. on Nov. 30, exclusive of goodwill, patents and deferred charges, amounted to \$125,000,000. Of current assets approximately \$4,500,000 consists of cash.

Regarding the personal affairs of John N. Willys, it can be said that he is in no way involved in the obligations of the Willys-Overland Co. Willy's stock market operations have not at any time been important and he has no important commitments now.

Fisher Body Merger Is Reported Near

NEW YORK, Dec. 20—Plans for the absorption of Fisher Body Ohio Co. by Fisher Body Corp. of New York are reported to have been completed and await formal action by the officers of the two companies. Fisher Body Corp. of New York, which is controlled by General Motors, owns a controlling interest in the Ohio company.

To effect a closer relationship, subject to further corporate action, Fisher Body Corp. has offered to exchange one share of its present common stock for five shares of the Ohio company common, and in addition to pay to each stockholder of the latter company \$2.50 for each share so exchanged.

Fisher Body Corp. will agree to pay current dividends on the preferred stock of the Ohio company, it is understood, and to pay off present accumulated dividends thereon within eighteen months. Accumulated dividends this year amount to \$8 a share. Directors of the Ohio company are understood to be in favor of the exchange and will recommend it to stockholders.

DORT TO ADVANCE PRICES

DETROIT, Dec. 20—Prices on the Dort car will be increased Jan. 1 as follows: Touring car and roadster, \$1,085 to \$1,215; coupe, \$1,765 to \$1,865; sedan, \$1,765 to \$1,995.

Hub Standardization Reduces Hub Sizes

Front Wheel Truck Axle Dimensions Tentatively Reduced to Five Standards

DETROIT, Dec. 17—The matter of the standardization of hub design which has been under consideration by the Automotive Metal Wheel Manufacturers' Association and other organizations, was discussed at a meeting held here yesterday. The meeting was attended by over twenty representatives of the concerns in this line of business and Cornelius T. Myers, consulting engineer who has been in charge of the preliminary work, presented his report.

The first matter to be standardized is front wheel hubs for truck axles. With the co-operation of axle and truck manufacturers, Myers has succeeded in tentatively reducing the number of sizes to five, and tentative dimensions for covering these five sizes have been drawn up and blue printed and were yesterday submitted to the meeting for approval insofar as the general scheme of standardization is concerned. This general approval was expressed.

The Metal Wheel Association, as well as the Wood Wheel Association, has been working for a little over a year on the standardization of hubs and has had the co-operation of the Society of Automotive Engineers in this work.

The move has the hearty co-operation of axle as well as bearing manufacturers, who have gotten behind the movement, not only for the sake of the wheel manufacturer, but also to reduce the number of axle designs on the market and to greatly simplify service problems. The program of future work will include passenger car fronts, and eventually rear axles on both trucks and passenger cars, as far as possible. Full details regarding the advantages of such standardization and the ideas behind the work have been printed in AUTOMOTIVE INDUSTRIES for April 1, April 29 and August 19, 1920.

Many Manufacturers Represented

Those present at the meeting were: R. L. Walker, J. H. Hammes, F. J. Storm, Sewell Cushion Wheel Co.; W. J. Bryan, Budd Wheel Corp.; F. Jehle, Aluminum Castings Co.; A. L. Putnam, H. A. Coffin, Detroit Pressed Steel Co.; W. E. Williams, American Steel Foundries; C. B. Wisenburgh, Standard Steel & Bearings, Inc.; R. P. Dowse, H. G. Norris, Goodyear Tire & Rubber Co.; H. H. Jackson, Wire Wheel Corp.; Walter E. Robertson, Robertson Resilient Wheel Corp.; Geo. L. Lavery, Jr., R. H. West, George L. Lavery, West Steel Casting Co., Willis Stutson, A. M. Laffand, Indestructible Wheel Co.; R. J. Burrows, Clark Equipment Co.; J. S. Hegeman, Bethlehem Steel Co.; C. T. Myers, consulting engineer; Robert Porter, Jaxon Steel Products Co.; J. E. Schipper, AUTOMOTIVE INDUSTRIES.

Railroads to Build Motor Truck Lines

New York Agricultural Conference Shows Carriers Soon to Augment Service

NEW YORK, Dec. 20.—Full recognition was given the important part played by motor vehicles in the development of farm life at a meeting held at Syracuse Friday to frame a definite and constructive agricultural and economic program for New York State. The conference was called by the State Department of Farms and Markets and was attended by representatives of all the agricultural organizations in the State, bankers, railroad executives, educators, prominent women and the National Automobile Chamber of Commerce.

F. W. Fenn, secretary of the motor truck committee of the N. A. C. C. was prepared to do missionary work for the truck but found little was needed. Even the railroad men, who have regarded motor vehicles with distinct suspicion until recently, readily admitted the value of the truck for short haul traffic, especially in agricultural regions. They have found that the tonnage it hauls feeds their lines and it is no secret that several of the carriers soon will be in the market for large numbers of trucks to augment the service given on their rail lines.

One of the most important steps taken at the meeting was the appointment of a committee on transportation, including Fenn and several railroad officials as well as representative of organizations of shippers, to co-ordinate all the elements of transportation as they relate to the farm. It was unanimously agreed that rural motor truck lines increase the efficiency of marketing and that efforts should be made to stimulate the development of these lines under co-operative ownership.

The good roads question also was given serious consideration. It was maintained that the improvement of side roads would do much to give access to shipping points. The majority of the farmers of the State were said to be without improved highways and compelled to use in spring and fall, roads which are almost impassable.

To Improve Rural Transport

The Departments of Farms and Markets is prepared not only to do everything possible to improve the rural transportation facilities in the State but it proposes to take effective steps to save the enormous quantities of farm products which are lost each year because it is impossible to market them to advantage. The chief means proposed to doing this is by the erection of co-operative warehouses in each county where fruit and vegetables can be stored until conditions are most favorable for marketing them. It is believed that in this way the consumer will get the benefit of huge quantities of fruit which now are allowed to rot on the ground.

DEPRESSION NEARS ZERO POINT

WASHINGTON, Dec. 20.—The bottom of the present business depression will be reached in the next thirty days, in the opinion of Archer Wall Douglas, chairman of the Committee on Statistics and Standards of the Chamber of Commerce of the United States in his monthly report on general business conditions, made public to-day in the Nation's Business.

"Advances of any moment in the prices of agricultural products will materially change the situation for the better, and reductions in the prices of commodities are likely to cause increased business in all industrial sections," said Douglas.

The report pointed out that "acute phases of the present depression will wear away steadily as the public adjusts itself to changed conditions brought about by a return to normal. Unfavorable agricultural situations, especially, have an unexpected way of remedying themselves."

Sheridan to Make Appearance This Month

NEW YORK, Dec. 20.—The election of Pierre S. du Pont as president of the General Motors Corp., to succeed W. C. Durant, means no change whatever in the plans and operations of the Sheridan Motor Car Co., the latest member of the General Motors group. This is the assurance given by D. A. Burke, president of the Sheridan.

"We are more than pleased with the progress already made at our plant in Muncie, Ind.," said Burke, "and we are especially gratified to note a constantly greater interest in the Sheridan and a growing demand for it. Our dealer connections now extend from coast to coast, in the principal cities. The demand for our car is already in excess of production, dealers having voluntarily sent us orders for more than 2000 cars.

"Our eight-cylinder car will make its appearance this month. Closed jobs in both four and eight-cylinder types will be ready for public inspection in a short time."

LAKEY GETS TRUCK ORDER

DETROIT, Dec. 17.—International Motor Truck Co. has placed an order with the Lakey Foundry & Machine Co., Muskegon, for from 4000 to 7000 motor truck castings, which the factory is expected to turn out at the rate of 75 a day. This order will enable the Lakey company to operate on its present basis of about 10 per cent of capacity for some time to come. The Lakey company formerly was employed to full capacity on Continental Motors Corp. work. The latter company is now turning out about 40 engines a day.

Government Gathers Implement Figures

Compilation of Statistics Expected to Show Extent of Motorization of Farms

WASHINGTON, Dec. 18.—Questionnaires will be sent to all manufacturers of farm equipment in an effort to collect information as to the extent to which farmers are using machines and other equipment. This census is under the direction of the Division of Agricultural Engineering of the Bureau of Public Roads. The survey will include tractors, trucks and all vehicles and implements. The inquiry will depend to a large extent upon the co-operation of manufacturers.

The National Implement and Vehicle Association will co-operate in this endeavor of the Department of Agriculture. The data will deal with sales, domestic and foreign, as well as manufactures for 1920. The reports of the individual manufacturers will be held confidential and the information given will be used exclusively in the compilation of statistics. The questionnaire method has proved effective in the annual surveys of the Office of Farm Equipment Control. This office recently made public a study of the production and sale of tractors.

In an official statement explaining the object of the census, the Department of Agriculture said "the use of improved equipment by farmers in this country is necessary for the welfare of agriculture, and it has had much to do with the prosperity of American farmers as compared with other countries. The importance of the farm implement and vehicle industry has long been recognized, but little information regarding its size as compared with other industries has been available. Such figures also will furnish a better basis for estimating the extent to which farmers are using machines and equipment, and the amount invested annually.

Goodrich Reorganizes Engineering Division

AKRON, Dec. 18.—Under S. B. Robertson, director of engineering of the B. F. Goodrich Co., who succeeded George Perks in that capacity, the Goodrich engineering department has been reorganized and put upon an entirely new and unique basis, with B. H. Clingerman, formerly managing power engineer, now in the capacity of consulting engineer for the company.

Clingerman has been with the Goodrich Co., for over two years. Under the reorganization announced by Robertson, J. H. Vance, former superintendent of power becomes power engineer. W. C. Hoover is the designing engineer, B. C. Mitchella, the structure engineer, E. D. Barry, material engineer; V. A. Parker, molding engineer, and W. F. Pierce, master mechanic. E. F. Myers and F. E. Blower are assistant master mechanics and W. P. Sheely is chief inspector.

Aeronautic Bureau Urged Upon Congress

Would Encourage and Regulate Commercial Aviation and Stimulate Developments

WASHINGTON, Dec. 18—Recommendations have been submitted to Congress by the National Advisory Committee for Aeronautics for the establishment of a Bureau of Aeronautics in the Department of Commerce for the regulation and encouragement of commercial aviation and for the authorization to conduct an American airplane competition in order to stimulate private endeavor in the development of new and improved designs of aircraft.

No definite plans for this competition have been made, because of the uncertainty, but it is intended, in the event Congress approves the project, to have the successful entries purchased by the Government at a predetermined and announced figure and made available for the postal service.

The legislative body has been asked to approve the proposed national aviation policy formulated by the Advisory Committee.

The committee wants \$131,600 for research into power-plants which they believe to be a necessity for the development of aviation. It is asserted that the capital investment, maintenance charges and fuel cost are all very high in the case of the present aircraft engine and must be materially lowered before the cost of power can be reduced to figures which will make possible the extensive development of commercial and pleasure aviation. The shortage and high cost of aviation gasoline, as well as the complication and relative unreliability of the carburetion and ignition systems, emphatically indicate the necessity for the development of an engine which will operate by direct hydraulic injection of low-grade fuel, with compression sufficiently high to ensure automatic ignition. The committee feels that the early development of an engine of this type is one of the most important technical problems involved in the growth of commercial aviation in this country.

Eliminate Water Cooling

"Perhaps," says the committee, "the next most important power-plant problem is the elimination of the water-cooling system, it being at present agreed that the added complication, weight and head resistance of the indirect cooling system are to be considered as fundamentally unnecessary handicaps to power-plant performance and reliability, and that these must ultimately be overcome. Although considerable research has been conducted upon the direct cooling of engine cylinders, the results must be considered as merely indicative and much yet remains to be done before the successful and economical direct cooling

of aircraft engines will become possible, especially with cylinders of large dimensions and high specific power output."

The program covers the requirements in this problem in a comprehensive manner.

The perfecting of supercharges, or other means for securing the maximum power output of aviation engines at all altitudes is considered to be one of the vital problems and the program provides for a continuation of the research examination of the many possibilities offered in this field. All of those applications of commercial, military and pleasure aviation which depend upon high speed for their successful fulfillment can only reach their complete development through flying at high altitudes with power plants capable of maintaining a high percentage of their maximum power output and equipped with variable pitch or variable characteristic propellers.

To Continue Performance Tests

The program also contains provision for continuing the performance tests of new types and improved forms of aircraft engines in the altitude chamber; the performance tests of all engine accessories such as carburetors, ignition appliances, lubrication appliances, and cooling appliances, including radiators in the form of complete units and also sample cores; and the study of other interesting developments of important engine details, such as pistons, valves, etc.

The two-cycle fuel injection automatic ignition engine appears especially promising. The problems incident thereto are being energetically studied abroad and some work is being done in this country. In particular, the Bureau of Engineering of the Navy Department has recently approved a fuel injection research program to be carried out at the Langley Memorial Aeronautical Laboratory, as the development of a successful engine of the fuel injection type is of especial interest to the navy in connection with the power plants of large airships.

Outline Immediate Studies

The program for the immediate future covers the study of the phenomena of fuel injection by means of a special glass-walled pressure chamber, in which many of the engine-operating conditions may be simulated, equipped with apparatus for taking very high-speed photographs of the events occurring in the pressure chamber. The results are to be applied to an experimental engine and a study made of the possibilities of the double-piston two-cycle engine in this connection. The problem of altering standard carbureted four-cycle engines will receive attention as well.

The direct air-cooled engine offers important possible advantages which have been studied by foreign laboratories and to a small extent by those in this country, largely in connection with the general problem of radiation. In connection with direct fuel injection, the air-cooled engine is especially interesting as looking toward the increase of thermal

(Continued on page 1297)

Highway Officials Seek More Trucks

War Department to Consider Request—Ask \$100,000,000 a Year for Roads

WASHINGTON, Dec. 18—Extension of the Federal aid program at the rate of \$100,000,000 annually for four years, has been recommended to Congress by a committee representing the American Association of State Highway Officials, which convened here this week. It was suggested that in public land States the funds should be available for two years after the period for which appropriated. The convention adopted a resolution urging additional transfer of trucks and other surplus material owned by the War Department.

The sessions of the convention were closed and the discussion confined to topics of vital importance to the highway engineer. The subject of snow-removal, which is important to truck manufacturers and users, was not under consideration. It was stated that the delegates talked of the feasibility of the office of Public Roads to prescribe limiting loads on Federal aid highways, classification of vehicles and highways.

A. R. Hirst, State Highway Engineer for Wisconsin, in discussing the relative service value of rural pavements, declared that "it would seem that it would be clear to even the feeblest minded that it is not going to be possible for the designers of vehicles using highways to turn loose upon the highways any behemoth their ingenuity may design at any time they feel like doing so. It isn't possible to reconstruct the highway system of America every few months, or even every few years."

He believes that it is imperative that the several States should adopt uniform standards for loads to be borne by roads of the different classes of importance. It seems inevitable, Hirst said, that highways must be classified and traffic made to conform to load limits. He advocated that highway engineers offer more consideration to the traveling public in keeping certain highways open during construction. "The road problem of America is not to build a few boulevards, it is to build, maintain and keep always open a transportation system," Hirst declared in advocating traffic distribution over several roads.

Would Divide Road Classes

In this connection, Charles J. Bennett, State Highway Commissioner for Connecticut, in suggesting the separation of highways into classes, pointed out the necessity of correlation between primary and secondary highways. He recommended that these roads should be designed to provide for the efficient use of the motor vehicle for commercial purposes without infringement on other means of transportation. Bennett said

(Continued on page 1297)

Commerce Chamber Seeks Tax Views

Questionnaire Is Mailed to Representative Organizations— Sales Tax Is Opposed

WASHINGTON, Dec. 20—Opinion of representative American business organizations on tax matters has been asked in a questionnaire sent out to-day by the Chamber of Commerce of the United States on a proposed program of Federal tax revision. The proposals submitted to a vote were compiled by the committee on taxation after a year's study of the problem from the standpoint of American industry.

Because it is the excise taxes that strike hard at the automobile industry, it is significant to note that the committee has recommended that "there should be excise taxes upon some articles of wide use but not of first necessity. Such taxes, the committee believes, should fall only on commodities—ordinarily at the point where the article takes its finished form and is ready to enter the channels of distribution—and should be levied only once on each commodity."

Possible opposition to this is voiced in the negative argument on the ground that inequalities would be produced and that, constituting additions to prices, these taxes would handicap various industries.

As the committee recommended against the sales tax its report in this case furnishes the negative argument. A turnover tax, it holds, would not be simple of administration; it would be pyramided, causing higher prices; its yield would be uncertain; it would work to the advantage of large industrial establishments which begin their processes with the raw material, carrying manufacture on to the completed article; it would tax but once foreign goods admitted; it would be unfair to persons at the bottom of the economic scale, on whom it would fall disproportionately heavier than on those who enjoy a wider margin between income and necessary expenditure.

Sales Tax Status Questioned

A final objection by the committee is that there would seem to be legal difficulties in the way in view of the fact that the Supreme Court has made it clear that such a tax is not authorized by the income tax amendment and that there is a question as to whether the courts would hold it to be a direct or an indirect tax. If a direct tax, it would have to be apportioned among the States, obviously an impracticable procedure.

The argument supporting the sales tax holds that difficulties of administration would not be so numerous as in administration of the excess profits tax; that it need not be pyramided; that means might be found to prevent advantage to integrated industries and to foreign goods; that it would have great practical value in that the business man would know exactly what he must turn

over to the Government and in that in the absence of especial incentive to evade it collection would be excellent; that it would be easier for persons of small incomes to pay than are heavy indirect taxes they now pay; that fewer persons would escape taxation. Administration of the tax in France, Canada, and the Philippines is cited.

Ericsson Creditors Get 60-Day Extension

NEW YORK, Dec. 21—The merchandise creditors committee of the Ericsson Mfg. Co. of Buffalo has been given an extension of sixty days in which to file an answer to the bankruptcy petition against the company and will request the receivers also to put in an answer denying allegations of insolvency. A careful survey of the plan discloses that the assets approximate \$900,000 after the most liberal allowance for depreciation of inventory and not taking into account good will and other intangible assets. The liabilities are about \$1,000,000 and orders on the books amount to \$1,500,000. The inventory was valued at much less than its actual replacement cost.

The creditors committee headed by W. M. Nones has taken a decided stand against the position of the receivers in not opposing bankruptcy. Notwithstanding this attitude of the receivers, both of them, when questioned by Sidney S. Meyers, counsel of the committee, virtually admitted that the company was well worth saving.

Ryan Indebtedness Funded for Two Years

NEW YORK, Dec. 21—An agreement has been practically reached between Allan A. Ryan and the committee of bankers who decided recently to take over his affairs as a means of protecting themselves from loss because of the shrinkage in the market value of securities pledged as collateral for loans aggregating \$16,000,000. It is understood the agreement provides that the Ryan indebtedness is to be funded for a term of two years with the assets held as collateral placed in the hands of trustees. If this agreement finally is signed it would appear to make it certain there will be no change for some time to come in the control of the Stutz Motor Car Co.

TO PIPE OIL TO BEHRING SEA

OTTAWA, Dec. 17—Conveyance of the oil products of the Mackenzie River basin to Behring Sea by pipe line from whence it would be carried by tankers to the markets of the world, is an ambitious project for which sanction will be sought by a bill to be considered by Parliament at the approaching session. The proposed pipe line would be laid from the Mackenzie River to the Yukon River systems by way of Rat River, thence by the Porcupine and Yukon rivers to salt water.

N. A. C. C. to Present Tariff Suggestions

House Committee Sets January 14 for Hearing—Would Lower Present Rate

WASHINGTON, Dec. 18—Chairman Fordney of the House Committee on Ways and Means has announced that representatives of the automobile industry may present their suggestions as to tariff revisions before the full committee on Jan. 14. The tentative proposals of the foreign trade committee of the National Automobile Chamber of Commerce call for a reduction of the present tariff of 45 per cent to 30 per cent and the establishment of reciprocal relations, particularly with Canada.

It is understood that T. Walter Drake will appear in behalf of the N. A. C. C. The discussion will be confined to Schedule C, paragraph 116, which covers automotive products. The committee has asked that in the preparation of briefs attention be given to the importance of the industry, its development and future prospects; domestic production, costs and wages, and comparable costs and wages in foreign countries and dumping activities of foreign firms.

The fact that the industry will urge a revision downward in the tariff is somewhat unusual because the new Administration is committed to high tariff policies. It is assumed, however, that tariff changes will be made whenever it is demonstrated that such a course will increase production and revive business generally.

Holt Farm Light Formed to Take Over Automatic

TOLEDO, Dec. 18—The Holt Farm Light Co. has been incorporated in Ohio for \$1,000,000 and will locate in this city. The new company takes over the Automatic Light Co. of Ludington, Mich., manufacturers of the Holt 110 volt direct current, without storage battery, farm light plant. Originally an Ohio product, designed by Scott J. Matthews of Port Clinton, Ohio, the unit now after three and one-half years of manufacturing in Michigan will soon come to Toledo for its permanent home.

The company elected the following officers: L. W. Holt of the Automatic Light Co., president; S. H. Humphries of Detroit, vice-president, and H. K. Greenman of the Automatic Light Co., secretary and treasurer. In addition to these officers, the directors are A. E. Kowalk, John E. O. Feller, W. W. Headings, and George H. Moore, Jr.

The plant at Ludington will be continued for such time as required to get a site in Toledo. Arrangements, however, will be made at once in this city for at least 50,000 feet of floor space in which to assemble the unit, the various component parts being manufactured at Ludington until it is possible to make the complete unit in this city.

Special Cables

French Grand Prix to Be Held July 23

Paris Automobile Show Places American Exhibits Last as Protest on Duty

(By Cable to AUTOMOTIVE INDUSTRIES)

PARIS, Dec. 20—The date for the French Grand Prix has been fixed as July 23. It probably will be held at Strasbourg. The Belgian Grand Prix will be held on Aug. 13 and the Italian on Sept. 4. All the races are for cars with engines of 183 cu. in. piston displacement.

The next Paris automobile show will be held in the Grand Palais from Oct. 5 to 16. Exhibits from the late enemy nations will not be admitted and American manufacturers will be given places only after the requirements of all other nations have been met. This ruling has been made as a protest against the pre-war American import duty of 45 per cent.

Exhibitors at the Paris Salon must undertake not to participate in any race or competitive exhibit unless it is approved by the National Federation of Automobile Manufacturers. As only the French Grand Prix has been approved up to the present time, smaller firms are protesting against being shut out from competing in events which interest them. It is declared that while this agreement applies to all of Europe it will not affect the United States.

According to reports from London, the English show will be held in September in order to get ahead of Paris. This seems unlikely, but in any event the Paris date will not be changed, as September is not a suitable month for an automobile exposition.

The special general meeting of the Berliet Company to consider a reduction of capital by annulling \$4,000,000 of founder shares, attributed to Marius Berliet in 1917, did not come to any decision, as the president stated negotiations were pending which would make the move unnecessary. This sudden change of front caused surprise among the creditors who are beginning to insist that their bills be paid.

A bill just submitted to the French Parliament provides for the control of the petroleum industry. Under the measure, importing and refining could be carried on only under a permit granted by the ministry of public works. Holders of these permits would be compelled to comply with certain conditions regarding the development of French oil

French Automotive Exports Grow \$230,342,000; Imports Are Reduced \$42,000,000 or 38 per Cent

PARIS, Nov. 30 (Special Correspondence).—French automotive exports stand at \$281,405,400, nominal exchange rate, to October 31, according to official statistics of the Ministry of Finance. The biggest single item in this total is \$142,919,400 for passenger cars and chassis; tires come second on the list with a value of \$66,826,200, with trucks in third place. All other items are comparatively small. Compared with the corresponding period of 1919, the increase on French automotive exports is \$230,342,400, or 451 per cent. The increase on passenger cars only is \$134,900,400, or 1682 per cent.

The increase in French automobile exports is enormous when compared with the pre-war period, for in 1913 the total was \$45,489,400, while for 1914, which includes four months of war, the total was \$42,429,400. In making a comparison, however, it should be borne in mind that the individual value of the automobiles exported is now very much higher than before the war, thus the number of cars sent abroad has not increased in the same proportion as the total value of the exports.

French automotive imports show a drop of 38 per cent for the first ten months of the year, the figures in 1919 being \$109,129,000, compared with \$67,580,600. Trucks head the import list, with bicycles second and passenger automobiles third. Practically all items are stationary or show a drop with the exception of bicycles, which have been increased by reason of important arrivals from Germany. Following are detailed official figures:

FRENCH EXPORTS		1919	1920
Automobiles (passenger and chassis).....		\$8,019,000	\$142,919,400
Tires		31,499,200	66,826,200
Automobile trucks.....		5,026,200	58,811,800
Airplanes		4,788,400	6,970,800
Bicycles		1,104,000	3,708,800
Automobile bodies.....		187,600	632,600
Motor cycles.....		77,400	609,400
Motor boats.....		10,000	561,000
Flying boats.....		208,400	198,400
Spherical balloons.....		142,800	166,200
Totals.....		\$51,063,000	\$281,405,400
FRENCH IMPORTS		1919	1920
Automobiles (passenger and chassis).....		\$4,142,400	\$3,100,800
Tires		36,011,000	24,183,400
Automobile trucks.....		64,295,800	34,646,600
Airplanes		497,800	547,200
Bicycles		1,457,200	3,355,000
Automobile bodies.....		1,673,600	1,223,000
Motor cycles.....		960,200	428,600
Motor boats.....		33,000	97,000
Flying boats.....		58,000	.....
Totals.....		\$109,129,000	\$67,580,600

fields, the construction of tank steamers and the installation of refinery plants. Monthly reports to the Government would be required regarding stocks imported and sold. The Government would have control over the supplies of fuel reserved for army and public services.

President Agnelli has resumed his position at the head of the Fiat Company, and the labor situation in Italy now is normal. Fiat is producing seventy automobiles a day.

BRADLEY.

AIR SERVICE FOR PHILIPPINES

WASHINGTON, Dec. 17—Five flying boats have been purchased for the Philippine Government by the Bureau of Insular Affairs from the Navy Department, to establish an aerial mail and passenger service between Manila and other large ports of the islands. The boats are two F-5-L and three HS-2-L, the former carrying thirteen and the latter type six passengers. The flying personnel consists of 30 Philippine National Guard officers who have been in training for six months. Service is expected to be inaugurated Jan. 1.

High Prices Hurt American Exports

NEW YORK, Dec. 17—Cable advices to this country point out that the market for American products in Holland is being undermined by the excessive retail prices asked. The matter has been made the subject of a special report to the State Department by Consul General Anderson.

It was shown that automobiles selling at retail for about \$5,000 in the United States are sold in Holland cities for the equivalent of \$7,000, though the ocean freight charges are only about \$200 and the import duty only 5 per cent. This exacting of profits is declared to work a severe handicap upon the continuance of American automobile popularity in Holland.

BRITISH OIL FIRMS MERGE

NEW YORK, Dec. 18—News has arrived here of the forthcoming combination of the Shell Marketing and the Anglo-Mexican Petroleum Co., which will be perfected on Jan. 1 under the title of Shellmex, Ltd.

Bankers Discuss Goodyear Future

Decision Expected at To-day's Session

No Statement After Four-Day
Conference — Wall Street
Optimistic Over Outlook

SUIT DISMISSED!

COLUMBUS, Dec. 23—The suit brought by Frank S. Monnett, former attorney general, for the appointment of a receiver for the Goodyear Tire & Rubber Co. of Akron, was dismissed to-day by Judge E. B. Kinkead on the ground that the petition filed failed to recite sufficient facts to warrant a receivership. The demurrer of the Goodyear company was sustained.

NEW YORK, Dec. 23—Apprehension is felt throughout the industry as to the fate of the Goodyear Tire & Rubber Co. against which a receivership action has been filed in the courts at Columbus by Frank S. Monnett, former attorney general of Ohio, and the owner of forty-five shares of preferred stock. The petition makes numerous charges against the officers but the most serious factor is that it asks an injunction restraining new financing which had been virtually arranged when the papers were filed.

The offices in Wall Street of Goldman, Sachs & Co., who head the syndicate which had almost completed working out the details of a financing plan which would have provided a permanent loan of approximately \$40,000,000 for the great tire company, have been the scene of virtually continuous conferences since Monday morning. The atmosphere in these offices is filled with "addition, subtraction and silence" but mostly silence so far as Goodyear is concerned.

Loans Mature in February

No statement, formal or otherwise, has been issued as to whether the Monnett suit will result in abandonment of the financing plan. Temporary loans of \$25,000,000 will mature the middle of February and the major part of the funds which were to be provided were to take care of these obligations.

It had been hoped that some decision would be reached by the conference yesterday but it was said this morning the meeting would be continued to-day and that it was expected something would be decided "one way or the other" before night. The session to-day is the most important yet held and President Seiberling is in attendance. The bankers represented,

besides Goldman, Sachs & Co. are William A. Reach & Co., Lehman Bros. and A. G. Becker & Co. of New York and Borton & Borton of Cleveland.

Most of those at the conference are expected to leave to-night for Akron to attend the meeting of directors called for to-morrow unless there is an eleventh hour decision to defer the meeting again.

The scenes have shifted so often in the last few weeks it has been difficult to follow the changes. It was realized nearly a month ago that actual control had passed to the bankers who had undertaken the temporary financing which was a preliminary to permanent loans.

Seiberling Driven To Banks

Only dire need drove President Seiberling to the bankers for he regarded their rates as usurious. The company sold \$28,000,000 worth of stock last June through its salesmen and it was hoped this would be adequate, but it was soon found the funds in hand were entirely insufficient. Seiberling then came to the New York bankers but went home disgusted when he found the rates they would charge. He then tried his luck in Chicago and met with somewhat better success. The result of these negotiations was the formation of the present syndicate headed by Goldman, Sachs & Co.

The intermediary in the negotiations between the Goodyear officers and the financial interests has been Frank H. Ginn, a Cleveland lawyer. In a statement announcing that plans had been practically matured for additional new financing to the extent of \$40,000,000 which would be ample to meet all the company's possible needs, he emphasized that there was danger of a destructive policy being precipitated in which case it would be impossible to go forward except through the long process of receivership and reorganization. The details of this financing were to have been discussed at the director's meeting Friday.

In his statement on the subject Ginn said:—

"It was a primary part of this financing plan, already practically arranged, that a board of directors should be installed consisting largely of men residing in Ohio whose established character and position in the industrial and financial world would be such that all parties in interest, preferred and common stock holders as well as creditors, would be absolutely assured that the company's affairs would be wisely managed and that responsibility for any mismanagement which may have occurred in the past would be conscientiously sustained and any consequent liabilities to the company would be promptly enforced."

It has been learned that Goodyear expects to show assets of \$75 for each

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Akron Is Anxious Over Suit Outcome

Fear Monnett Action Will Be
Serious Stumbling Block to
Reorganization

AKRON, Dec. 21—The suit for receivership of the Goodyear Tire & Rubber Co. is a matter of serious concern both in Akron and in financial circles embracing banking groups prepared to arrange a permanent financing program.

Inasmuch as Goodyear stockholders at a meeting Friday are to be asked to ratify proposed re-organization of the company, the reduction of capital common stock from \$100,000,000 par to \$50,000,000, the placing of participating stock on a no par value basis and the issuance of not to exceed \$50,000,000 in gold mortgage bonds to make possible the permanent financing, pendency of Monnett's litigation, it is believed, will constitute a serious stumbling block, unless the courts of Franklin County should dismiss the suit, abate any application for temporary or permanent injunction, and deny the application for appointment of receivership.

According to the law firm of Tolls, Hogsett, Ginn and Morley, of Cleveland, legal representatives of Dauphinot and Cummings of New York, who represent Goldman, Sachs & Co., creditors who have advanced funds of \$25,000,000 to the Goodyear company temporarily, are satisfied with present conditions and the announced re-financing program, and are not disposed to support any move for a receivership. The loan, negotiated by Goldman, Sachs & Co., is payable Feb. 15, and it is stated upon definite authority, that the Goodyear company must consummate the permanent financing program for at least \$40,000,000 for a period of not less than ten years before the loan is due in February.

Monnett Charged Unloading

It is distinctly recalled by men in Goodyear acquainted with the situation that Monnett, at the time of issuance of the preferred stock, wrote to the company and to President Seiberling intimating that he had evidence substantiating the assertion then made that the company's officials were unloading their own stock and at the same time urging those on the outside to invest heavily in it. Monnett in that letter recited as unattested assertions, many of the things he now includes as definite allegations in his petition for receiver.

At the time the preferred stock was issued, Goodyear employees were advised to invest, an installment plan of

(Continued on page 1295)

Many Irregularities Charged by Monnett

Investment Company Actions Basis for Suit—Move to Quash Service Summons,

COLUMBUS, Dec. 22—The Goodyear Tire & Rubber Co. has filed a motion to quash the service summons in the receivership case filed against it by Frank S. Monnett, former attorney general of Ohio, in the State Courts. The company alleges it has no agent in Franklin county and that the summons was served upon a man who merely is in charge of the supply depot in Columbus.

At the same time Frederick W. Freeman, who was made a co-defendant in the suit because he participated in the sale of stock, filed a demurrer to the receivership petition and alleged that none of the charges contained in it would stand in any way against him.

The suit filed by Monnett is directed against the company, all its directors and against all its subsidiaries, both domestic and foreign. Its main purpose is to restrain financing plans now under way and it also asks an accounting. In effect it charges the directors with malfeasance. Chief reliance seems to be placed upon the assertion that the Goodyear Investment Co. is owned by the directors and members of the executive committee and that it has been used by them to make enormous personal profits.

These are some of the charges made in the complaint:

That the Goodyear Investment Co. extravagantly purchased the Ford assembling plant in Long Island City for \$2,000,000 in addition to assuming a mortgage of \$1,750,000.

That the Investment company purchased a cotton plantation near Bakersfield, Cal., at a loss of \$15,000.

That the Investment company organized the Goodyear Tire & Rubber Co. of California and the Pacific Cotton Mills of California and purchased the entire capital stock of the cotton company at a loss of \$4,000,000.

That the Investment company purchased a 24,000 acre cotton plantation in Arizona at a loss of about \$500,000.

That it purchased 20,000 acres of rubber land in Sumatra at a loss of about \$500,000.

That the Investment company organized ten foreign corporations at a profit to itself of \$5,000,000.

That the stock issue last summer was illegal because there was no surplus instead of the \$43,000,000 surplus alleged by the directors.

That the directors paid a 2½ per cent dividend last fall when there was no surplus on hand from which to pay it and that funds to pay the dividend came from borrowing money or issuing stock.

That the company received less than 85 per cent of the proceeds of the sale of \$27,000,000 worth of stock and that the remainder went to brokers.

FORD GOES WELL OVER MILLION MARK

DETROIT, Dec. 21—The Ford Motor Co. went over the scheduled million mark for 1920 at the end of the day's work, Dec. 16. The total that night was 1,002,515 completed vehicles. The plant will continue operating on the present schedule of 4,000 daily until Christmas Eve. The production figures include cars and trucks.

The Ford Motor Co. of Canada and General Motors of Canada, the two largest plants on the Dominion side, will resume full time operations Jan. 3. Canadian Ford now is working four days a week and the General Motors plant is virtually closed.

The Studebaker Detroit plant will close Thursday night until Jan. 10. It is now working three days a week with a limited force. Cadillac will close Dec. 23 for inventory and Packard the following day. Both will reopen Jan. 3.

That the stock issue was in violation of a stipulation that 200 per cent of the net tangible assets and 10 per cent of the net current assets must remain at all times for payments on preferred stock.

That the issuing of this stock damaged the preferred stockholders by \$31,000,000 and the common stockholders by \$48,000,000.

That the directors paid a stock dividend of 150 per cent last July when the company had no surplus.

That the directors borrowed \$25,000,000 at usurious rates, thereby losing \$500,000.

That the directors seek an additional loan of \$25,000,000.

Detroit Steel Products Adds \$4,000,000 Capital

DETROIT, Dec. 20—The Detroit Steel Products Co. has increased its capital from \$1,250,000 to \$5,250,000 and declared a common stock dividend of 300 per cent. President J. G. Rummey says both the United States and foreign representatives report that conditions have improved and the plant workmen are now being used to get the plant into shape for the business revival expected about Feb. 1. The company began operations about sixteen years ago and up to the present period of financial depression it had been running steadily. Production ceased a few weeks ago but the men were retained to overhaul the plant.

IMMEL COMMITTEE NAMED

COLUMBUS, Dec. 18—A committee of seven, headed by M. S. Connors, general manager of the Hocking Valley Railway, has been named by the stockholders of the Immel Co., body manufacturers of Columbus, to look after their interests in the receivership.

Replacements Make Good Business Sure

M. A. M. A. Questionnaire Shows Members Agreed on Normal Revival in 1921

NEW YORK, Dec. 21—Sane confidence in the future of the industry is evidenced by replies received by the Motor and Accessory Manufacturers' Association to a questionnaire sent to its 384 members asking their opinion of the outlook for 1921. The questionnaire emphasized that frank and candid estimates were sought through analysis and honest personal investigation. The replies in most cases came from the ranking executives of companies.

Faith in the economic soundness and strength in the industry was expressed by the parts makers in every case. They display sane optimism and confidence in the future with the belief that normal buying will return next year and bring about a healthy and progressive growth. The following is a composite view of the principal tendencies and characteristics of 1921:—

1. Stimulation of business following National Automobile Shows in January.
2. Marked revival of buying about Spring.
3. Greater emphasis upon economic utility of passenger cars and motor trucks.
4. More conservative and prudent business methods.
5. More aggressive and intensive advertising and sales effort.
6. Large normal replacement business.
7. Greater efficiency and economies in production and management.
8. Growing importance of automobile as transportation unit.

One of the queries in the questionnaire was, "Will there be a shortage of automobiles in 1921?" The replies evidenced considerable divergence of opinion. There were quite a number who replied in the affirmative, some in the most emphatic fashion, and others who said "yes" with limitations. All were agreed that the year gives promise of good business. One of the middle-ground statements contains an analysis showing that the replacement business alone would make necessary the building of 1,800,000 vehicles.

Testifying to their confidence in the future of the industry many manufacturers point to increased sales and advertising programs for 1921.

GASOLINE PRICES LOWERED

NEW YORK, Dec. 22—Wholesale gasoline prices have been reduced nine-tenths of a cent in Pennsylvania and Delaware, or from 30.6 cents to 29.7 a gallon.

The Standard Oil Co. of Indiana has reduced the wholesale price of gasoline 1½ cents a gallon to 25 cents, and the retail price one-half cent to 27 cents.

Bankers Discuss Goodyear Future

Refinancing Plan Called for New Directorate—Auditors Report to Be Submitted

(Continued from page 1293)

share of common stock after all depreciation is charged off. An audit now being made by Price, Waterhouse & Co. will be read at the directors' meeting. There has been a very heavy shrinkage in the inventories of the company. Goodyear had contracted for crude rubber in the open market in addition to supplies from its own plantation in Sumatra and it has been necessary to sell much of this large surplus stock to smaller rubber companies in and near Akron. It is understood that much of this surplus crude rubber which was bought at 50 cents a pound and more, has been sold for 17 cents.

There is much speculation in this city as to whether Frank S. Monnett, former Attorney General of Ohio and owner of forty-five shares of preferred stock in the company, who filed suit asking for an accounting and the appointment of a receiver, acted solely in his own behalf. Reports from Akron are to the effect that it is believed there Monnett is acting in the interests of a financial group hostile to Seiberling and also that one of the "Big Six" tire companies is connected with the proceedings.

Significance also is attached in Akron to the fact that Price, Waterhouse & Co. who are now in charge of the Goodyear finances, have had close relations with interests which recently acquired control of a large automobile combination. Confirmation of these reports has been impossible here and there is no reason to believe they are well founded. It is understood, however, that 51 per cent of the common stock of the company was pledged when temporary financing recently was put through.

Bethlehem Stockholders to Protect Interests

NEW YORK, Dec. 22—A committee has been formed, with B. W. Jones, as chairman, at the instance of a number of shareholders of the Bethlehem Motors Corp., which has been in the hands of Receiver C. E. Woods, since Aug. 25, last, to protect the interests of the shareholders and with the ultimate hope of being able to present to the stockholders a plan of reorganization which will preserve their equity in the property. The other members of the committee are Otis A. Glazebrook, Martin E. Kern, and M. Morgenthau, Jr.

A circular to the stockholders says in part:

"It is of the utmost importance that the stockholders should act together in this matter. The present condition of the automobile industry, as well as general financial conditions, increases the

necessity for concerted action. Committees have been appointed to act for the banking creditors and for the merchandise creditors, and it is hoped that the stockholders' committee can co-operate with the creditors' committees in presenting to all parties interested, a practical plan.

"A deposit agreement to be dated Dec. 15, 1920, is now in the course of preparation, and will be sent to stockholders as soon as possible. In the meantime stockholders are urged to deposit their stock with the Bankers Trust Co., 16 Wall Street, New York City, the depository for the committee, in exchange for which a transferable certificate evidencing such deposit will be issued."

Zimmerschied Named Chevrolet Manager

NEW YORK, Dec. 23—Pierre S. du Pont, president of the General Motors Corp., announced to-day the appointment of K. W. Zimmerschied as general manager of the Chevrolet Motor Co. to succeed W. C. Durant. It is understood that F. W. Hohensee will continue as general manager of production for Chevrolet and W. C. Sills as general manager of sales.

Zimmerschied has been identified with the General Motors organization since 1911 and for the past two years has been assistant to the president of the corporation. His first connection with the company was as metallurgist at Flint. During the war he served the Government in Washington and at its close came to General Motors' headquarters here. His relations with Durant always have been close.

FIRESTONE RE-ELECTS OFFICERS

AKRON, Dec. 18—Plans for improving plant facilities were made at a meeting of the Firestone Tire & Rubber Co. directors Dec. 16. These include the building of an interplant railway system of standard gage to connect with the steam roads entering Akron. The old board of directors has been re-elected and the board has elected the following officers: President, H. S. Firestone; vice-president, A. C. Miller; vice-president, Thomas Clements; secretary, S. G. Carkhuff; treasurer, J. G. Robertson. The board voted the regular quarterly dividend on the preferred capital stock, 6 per cent, payable Jan. 15 to stockholders of record Jan. 1.

SELDEN DECLARES DIVIDEND

ROCHESTER, Dec. 18—The Selden Truck Corp. of this city has declared a regular quarterly dividend of 2 per cent on the first preferred stock and the regular quarterly dividend of 2½ per cent on the second preferred stock. Payment of both dividends will be made Jan. 3. The Selden Truck Corp. continues its record of never having missed a dividend payment. Officers of the company were re-elected as follows: George C. Gordon, president; R. H. Salmons, vice-president; William C. Barry, vice-president; H. T. Boulden, vice-president; S. P. Gould, secretary; E. B. Osborn, treasurer.

Akron Is Anxious Goodyear Future

Rapid Descent of Stock Caused Heavy Losses—Seiberling Denies Insolvency

(Continued from page 1293)

payment being adopted with sums deducted from wages and salaries twice monthly to cover payments. Later the company offered preferred and common stock in blocks of two shares of preferred and one of common for \$300, stipulating that payment must be made within ten days. Many employees borrowed to make the cash payments on such stock purchases, giving the stock as collateral. Common stock was then far above par value. Soon after the stock began to depreciate on the market. Banks financing Goodyear employees in their purchases began calling for greater margins and finally liquidated, but not soon enough to stave off losses to themselves, so rapidly did the stock tumble. The rapid descent of Goodyear common and preferred virtually wiped out many men, and plunged others heavily into debt.

After the filing of the suit, Seiberling issued a statement denying allegations that the company was insolvent.

"The claim that the directors of the company have been operating to their personal advantage and to the detriment of the stockholders of the corporation through a company known as the Goodyear Investing Co. is wholly without foundation," Seiberling said. "No such company now exists or ever did exist. There is a company known as the Goodyear Improvement Co., a subsidiary company, owning warehouses of the Goodyear Tire & Rubber Co. in various cities throughout the United States and Canada. This company is operated wholly for the benefit of the Goodyear Tire & Rubber Co., and all profits that ever accrue to it have come to the Goodyear Tire & Rubber Co., and now belong to it.

"Mr. Monnett's statement that the stock dividend declared in June, 1920, and the quarterly dividend paid on common stock in September of this year, were not paid out of surplus earnings is also untrue."

Ample Assets To Meet Debts

Seiberling declared that after charging off all inventory losses the company still has ample assets with which to pay its indebtedness and to cover its entire issue of preferred stock, and still have many millions of dollars for the common stockholders.

"It seems almost unthinkable," he said, "that a man with any business sense would have commended an action as unwarranted as that of Mr. Monnett at this time when business the country over is going through a period of readjustment, and needs the co-operation not only of creditors but especially of stockholders."

S. A. E. Sets Program for Annual Meeting

Twelve Sessions Arranged for Activities—Annual Business Meeting January 12

NEW YORK, Dec. 21—The program of the annual meeting of the Society of Automotive Engineers, which will be held in the Engineering Societies Building, this city, Jan. 11 to 13, has been completed. In addition to the annual meeting winter meetings of the society will be held in Chicago and Columbus, the former on Feb. 2 in conjunction with the National Automobile Show there, and the Columbus meeting Feb. 10, in conjunction with the National Tractor Show.

The program of the New York meeting follows:

TUESDAY, JAN. 11 Standards Meeting

Morning and Afternoon—Discussion of the revisions of and additions to prevailing S. A. E. Standards and Recommended Practices which will be reported by the Divisions of the Standards Committee.

Aeronautic Session.

Evening—Technical meeting to consider the recent engineering developments in aircraft, such as variable camber wings, metal construction, internally trussed wings, retractable chassis, and propellers. Authoritative papers to be presented on these topics.

WEDNESDAY, Jan. 12 Annual Business Meeting

Morning—Election of officers for coming year. Finance. Membership, Meetings, and other committee reports.

The Engineer's Place in the Industry

A definition of the increasing influence of the engineer in industry, the greater responsibility which he must assume, and the necessity for his building confidence around his undertaking. Presented by three prominent executives of the automotive industry.

Body Engineering Session

Afternoon—The genesis of a closer co-operation between engineers engaged in this automotive work. Consideration to be given to tendency in design, construction and methods of production. Encouragement of standardization in this field and reduction in body weight.

Aeronautic Session

The development of commercial aviation using both lighter and heavier-than-air types. Presentation of the progress of air transport in Europe, and study of its future possibilities in America.

Chassis Session

Increasing the efficiency of the automotive chassis to conserve fuel. Study of mechanical losses, advisability of smaller engines and higher axle ratios, reduction of sprung and unsprung weight. Possibility of European types of small cars in America.

"The Carnival"

Evening—The social event of the S. A. E. year! Colorful, mirthful, sensational. The annual reunion of the S. A. E. family where members, wives and sweethearts revel in an environment of music and dance.

ALLIES RELEASE PLANES CONSIGNED TO LARSEN

NEW YORK, Dec. 21—Information has been received here that 11 all-metal Junker airplanes consigned to the United States but held up at Hamburg by the Inter-Allied Commission of Control, have been ordered released. It has been learned that these machines are being shipped to John Larsen, who is the Junker's representative in this country and who introduced the all-metal planes to the United States by selling them over the counter at \$30,000 each to the Post Office Department. It is presumed the machines will come into the country through Baltimore. Larsen, it is said, expects to sell 400 Junker planes in this country before May. Several have been ordered by the Navy Department.

THURSDAY, JAN. 13 Fuel Session

Morning—Discussion of efficient utilization of present high endpoint gasoline in internal combustion engines. Analysis of valuable research in the phenomena of combustion and detonation. Employment of increased compression pressure with knock eliminated.

Fuel Session (Continued)

Afternoon—Consideration of combustion and flame propagation. Distribution problems. The petroleum refiner's viewpoint. Extent and effect of crankcase dilution. Symposium of the leading authorities' present views.

Highway Session

Effect of the heavy automotive vehicle on highway surface. The study of subsoil and its relation to surface durability. A meeting to further develop co-operative contact with the civil engineer who builds and maintains the roadbed on which our products operate.

The Annual S. A. E. Dinner—Hotel Astor at 7 O'Clock

Evening—The formal climax of the meeting when engineer, producer and salesman dine in fraternal spirit, exchange stories of the early days of our dynamic industry and hear words of wisdom spoken by eminent leaders in American business. The largest single gathering of representative men in the automotive industry.

JAPAN BUYS ENGINE RIGHTS

PARIS, Dec. 5 (*Special Correspondence*)—Licenses for the construction of all types of Lorraine-Dietrich aviation engines have been sold to the Imperial Japanese Government. At the present time, Japanese engineers and skilled artisans are at the Lorraine-Dietrich factory, near Paris, obtaining instruction in the building of these engines. As soon as sufficiently advanced, it is intended to build the engines in Japan. The Lorraine-Dietrich line consists of 6, 12, 18 and 24-cylinder engines varying from 150 to 1000 hp. The type which is of greatest interest to the Japanese is the 12-cylinder, 500 hp., with Delco ignition. This engine has a bore and stroke of 126 by 200 mm.

Napier Motors Wins Suit on Title Right

Edge and J. S. Napier Agree to Eliminate Name from New Company's Business

LONDON, Dec. 8—(*Special correspondence*)—The High Courts have just tried an interesting and in some respects an important motor case affecting the proscriptive right of firms to a title whether personal or otherwise, but of such import that certain wares have come to be identified with it.

The case was an action by D. Napier & Son, Ltd., makers of Napier cars and trucks and airplane engines, to restrain S. F. Edge and J. S. Napier from using the name "Napier" in any way likely to infringe the Napier company's registered trade mark "Napier." The original Napier firm is one of the oldest in the British engineering trade, the firm being started in 1808 by David Napier, and continued directly by members of the family with the same name.

In 1900 the firm became D. Napier & Son and started to make and sell automobiles, and in 1906 registered the name "Napier" as a trade mark. From 1899 to 1912, S. F. Edge, trading first as the Motor Vehicle Co., and later as S. F. Edge, Ltd., was so intimately associated with the Napier output and fame as considerably to increase both the reputation and output of Napier products.

In October, 1912, Edge sold his interest in S. F. Edge, Ltd., to D. Napier & Sons, Ltd., for £160,000 (\$800,000) and agreed virtually to remain out of the trade until 1919. In March, 1919, the Napier company changed its title to Napier Motors Ltd. and subsequently a new company was formed which acquired both the Napier business and the business good will of S. F. Edge, Ltd.

Edge and his co-defendant J. S. Napier formed a £1000 company early this year and in their reply to the suit pleaded that the combination of their names as a company title is fair and reasonable and not calculated to be confused with the other "Napier" title. At the second day's hearing the action was settled by agreement between the litigants on terms which may be summed up as follows:—

Drop Names of Partners

The defendants Edge and John S. Napier to change the name of their firm in such a way that neither the name Edge or Napier forms part of the title, and in general terms not to do anything likely to mislead as to the title "Napier," nor to prejudice the Napier company's rights in the term "Napier." The agreement expressly entitles the defendant J. S. Napier to continue his name rights in respect to automobile goods patented by him, or which may be so patented by him.

The just issued year's trading report of D. Napier & Sons, Ltd., shows on the whole a fair result. A deficiency of upwards of \$900,000 on last year's balance is changed into a surplus of \$340,000.

Aeronautic Bureau Urged on Congress

Importance of Research and Development Work Detailed in Committee Report

(Continued from page 1290)

efficiency and the reduction of engine weight.

The program provides for the continuation of the research into the problem of direct transfer of heat from cylinder walls to air, and, if possible, the extension of the results to the development of efficient cylinder forms.

The development of a radial engine of the air-cooled type has received the serious attention of research laboratories of both Great Britain and France. In this country very little has so far been done along this line, but the Air Service of the Army at McCook Field is now undertaking the problem, and at the present time is developing at two outside laboratories radial air-cooled engines. The Army Air Service has nearing completion an 18-cylinder engine of 600 to 700 horsepower.

The development of an engine particularly suitable for a power unit for the operation of lighter-than-air craft is now being carried on by the Navy Department. To further this work and obtain an engine of general characteristics, and still allow leeway for individual design of detail, the Bureau of Engineering has let contracts to three separate engine manufacturers. The general specifications call for an engine with six cylinders in line, of approximately 300 horsepower, the main characteristics of which will be low fuel and oil consumption, together with a high degree of reliability. One engine of this class being constructed is of the Ricardo type, as it is hoped that by the use of the Ricardo principle of construction the life and reliability of the engine will be greatly increased.

Major General Menoher, chief of Air Service, recommended that in order properly to foster the aeronautical industry, the Government should announce, by legislative enactment, a policy which will provide for the manufacture of aircraft, covering a period of from three to six years, and must at the same time provide the necessary assurance that funds will be appropriated therefor annually during the continuances of the policy.

Highway Officials Seek More Trucks

(Continued from page 1290)

that the restrictions as to loads adopted at Chicago in 1918 after a conference of motor truck manufacturers and highway officials, should be modified until primary highway systems are completed. It is suggested that the maximum allowable total load for secondary high-

ways shall be 12,000 lbs, unless the load is carried on pneumatic tires, when it may be increased to 15,000 lb. None of the limitations suggested have taken into consideration the passenger car, as either system properly designed should accommodate the passenger car when load alone is considered.

Better rail service for the transportation of highway material was promised by A. G. Gutheim of the car service section of the American Railway Association. The lessened demand for coal cars, he said, would permit an easier movement of highway materials.

House Recommends \$100,000,000 for Roads

WASHINGTON, Dec. 21—An appropriation of \$100,000,000 for State road aid has been agreed upon by Republican leaders in the House. This action was taken at an executive session of the House roads committee but it was not stated whether this amount would be made available for work during the coming fiscal year or for that year and the year following.

Representative McArthur, Republican, of Oregon, has introduced a bill which is now before the roads committee, which would make \$400,000,000 of Federal funds available during the next four years. In the interest of economy, however, the Republican steering committee has indicated, it develops, that the appropriation should be limited to \$100,000,000 and should not cover more than a two year period.

Members of the roads committee have expressed the opinion that action will be taken by Congress on road matters during the present session.

Dunlop to Furnish Funds for Plant Here

NEW YORK, Dec. 21—A cable dispatch from London says that the Dunlop Rubber Co. announces that it recently assumed responsibility for providing additional funds to place its American subsidiary in a position to complete construction work on the \$15,000,000 factory at Buffalo and to provide working capital. It said that the greater part of \$5,000,000 has been sent to this country in the last few weeks and that negotiations now are under way to provide further necessary funds for the American company. There have been reports that Dunlop was seeking \$25,000,000 in this country.

CURTISS SUES HANDLEY PAGE

NEW YORK, Dec. 21—The Curtiss Airplane & Motor Corp. has brought two patent infringement suits in the United States District Court against Handley Page, Ltd., and the Airplane Disposal Co., another English corporation. Ten patents are involved in the litigation, which is based on efforts of the defendants to sell in this country surplus war planes which were purchased from the British Government.

METAL MARKETS

METAL producers, both ferrous and non-ferrous, as well as steel manufacturers have begun in earnest the task of adjusting the wage scales of their operatives to the changed condition of affairs. The relative ease with which this dreaded job is being accomplished, is a potent antidote against the lackadaisical attitude which so many producers have displayed ever since values began to hit the toboggan. Moreover, there is comfort in the thought that it was in January, 1920, that the heaviest orders were placed by the automotive industries. It is recalled by the steel trade that in that month, the Ford Motor Co. alone contracted for more than 150,000 tons of steel, including the spectacular purchase of 87,000,000 nuts. While the steel industry, at this time, is in no mood to chase rainbows, it is confident that buying activity is bound to make itself more felt in the first month of the new year. Many of the shut-down's stressed in the daily newspapers, with the good result, perhaps, of putting the fear of starvation into the hearts of malcontents in the ranks of labor, are, in fact, nothing more than the customary holiday and inventory time suspensions which, in normal years, never attracted much attention. The deadlock that has existed for some time in the pig iron market, is showing signs of dissolving in the near future. Coke prices have come down and are still traveling lower, the coal market being under pressure all around, chiefly, however, because the railroads are beginning to realize that, unless fuel costs are speedily reduced, they will not be able to earn 6 per cent. All in all, it seems as though, very early in the new year, prices for all classes of semi-finished and finished steel and non-ferrous metals will have settled on a basis that will permit automotive purchasing agents to enter the market with more confidence in reasonable stability of values than they could in several years.

Pig Iron—The market for No. 2 foundry is anywhere between \$30 and \$35, furnace. Buying is virtually nil but it is gratifying to note that producers are in a more tractable frame of mind, going even so far as to offer pig for first quarter 1921 delivery at a price to be adjusted at the time of shipment on the basis of the "Iron Age" quotation for that week. Offers like these, with the price left open, invariably portend an early getting together of buyers and sellers and an untrammelled course of the market, free from artificiality. With the period for establishing losses for tax reduction purposes drawing to a close, resale transactions are dwindling. Producers' stocks are heavy, those in the South approximating close to 100,000 tons. Nothing further has been heard regarding the Ford Motor Co.'s low priced offerings which, as stated in this report, were obviously intended to be restricted to foundries turning out Ford castings.

Steel—The price for automobile body sheets, No. 22 gage, is 5.70c. While several of the leading automobile sheet independents have shut down, others are filling in with lighter gages while striving hard to secure fresh bookings for automobile sheets. Although the blast furnaces of the United Alloy Steel Co. which caters almost exclusively to the automotive industries, are closed, the company's steel mills are running on a curtailed basis. It appears to be the understanding in the trade that cold-rolled strip steel will be generally placed on the American Steel & Wire Co.'s basis of 6.25c. Hot-rolled remains nominally on a 4c. base.

Automotive Financial Notes

International Harvester Co. has declared a 2 per cent stock dividend on common stock in addition to the regular quarterly cash disbursement of 1½ per cent, which is in the nature of a semi-annual payment. This is in line with the announcement last June when authorized common stock capitalization was increased from \$80,000,000 to \$110,000,000 to enable it to take care of its profit-sharing plan for employees payable in stock and the payment of stock dividends. The payment of the initial semi-annual stock dividend places the common on an 11 per cent annual basis, 7 per cent payable in cash and 4 per cent in stock.

Antigo Tractor Co., Antigo, Wis., which recently purchased the entire business, plant and equipment of the Murray-Mylrea Co., a large foundry and machine shop concern at Antigo, has authorized an increase in capitalization from \$500,000 to \$1,000,000. The new issue will be used to finance additions and improvements in the plant, purchase of additional materials, and otherwise provide for the beginning of quantity production on Jan. 1.

Lee Rubber & Tire Corp. will close the year with no special inventory shrinkage to absorb. Quick assets are well in excess of five times the liabilities. Floating debt is down from a summer peak of \$800,000 to \$500,000. The company in October earned at the rate of \$2.40 a share on its 150,000 shares and for the full year is expected to show slightly better than \$3 a share.

Gold Seal Battery Co., a new \$300,000 corporation organized at Green Bay, Wis., expects to be ready to start quantity production of Gold Seal storage batteries by Jan. 1. Equipment has been purchased for a daily production of 100 batteries a day, with an estimated output of 20,000 during the first year.

Kempsmith Mfg. Co., Milwaukee, has increased its authorized capitalization from \$600,000 to \$1,000,000. The new issue, which is absorbed by the present stockholders, is made to finance the development of the business, following the completion of extensive enlargement of the production facilities within the past year.

General Machine & Tool Co., Jackson, Mich., was granted authority to increase its capital from \$100,000 to \$250,000; American Twist Drill Co., increased from \$200,000 to \$400,000; Universal Body Company, Jonesville, \$25,000 to \$101,500; Gear Grinding Machine Co., \$300,000 to \$400,000.

Van-Dorn Dutton Co. has declared a quarterly dividend of 2 per cent on preferred and 50 cents on common payable Jan. 1. The Van-Dorn Electric Tool Co., an affiliated concern, has declared a 2 per cent dividend on preferred payable Jan. 1, and 45 cents a share on common payable Feb. 1.

Dodge Manufacturing Co. has declared a quarterly dividend of 1½ per cent and an extra dividend of 1 per cent on common payable Jan. 3. A quarterly dividend of 1½ per cent on preferred also has been declared payable Jan. 1.

Great Lakes Malleable Co., Milwaukee, has effected an increase in capitalization from \$150,000 to \$250,000 to accommodate the expansion of the business and production. Ray F. Ethier is secretary.

Telltale Spark Plug Co., Detroit, was incorporated this week with a capital of \$50,000 to operate a machine shop and sell patented spark plugs. The incorporators are Isaac Harris, Isaac Ranson and O. H. Toliver.

Parish & Bingham directors are expected to pass the regular quarterly dividend of \$1 a share when they meet the latter part of December. Depressed demand has cut down operations at the factory to a small scale.

F. B. Stearns Co. has declared a dividend of \$1 a share payable Jan. 10. Business during November was larger than the November business of last year.

Hall Lamp Co., Detroit, has declared a 5 per cent dividend on outstanding common making 20 per cent paid stockholders this year. The last dividend is payable Dec. 24.

Moon Motor Car Co. directors have declared the regular quarterly dividend of 1½ per cent on preferred stock, payable January 3.

Republic Motor Truck Co., Inc., has reduced its directorate from fifteen to nine. The regular quarterly dividend of \$1.75 a share on preferred stock will be paid Jan. 3.

Hupp Motor Car Corp., has declared a quarterly dividend of 1½ per cent on the 7 per cent preferred payable Jan. 2.

International Motor Truck Corp. has declared a dividend of \$1.75 a share on the first and second preferred, payable Jan. 3.

American Lubricator Co., Detroit, increased its capital from \$150,000 to \$117,500.

Reo Motor Car Co., has declared a quarterly dividend of 2½ per cent payable Jan. 3.

Two Companies Divide R & V Manufacturing

EAST MOLINE, ILL., Dec. 18—Characters have been granted by the state to the two organizations which take over the Root & VanDervoort Eng. Co., which for several weeks past has been in process of separating its engine manufacturing and automobile departments.

The Moline Engine Co., a subsidiary of the Moline Plow Co. takes over the manufacture of engines and machinery. It has a capital stock issue of \$1,180,000 preferred and \$1,750,000 common. The Root & VanDervoort Eng. Co. holds all the capital stock and \$1,749,500 common stock is subscribed by the Moline Plow Co.

The R. & V. Motor Co., with a capital stock of \$6,500,000, will continue the manufacture of automobiles. Stock is held largely by interests prominent in the original Root & VanDervoort corporation.

MASON SALES, \$6,598,000

AKRON, Dec. 18—The Mason Tire & Rubber Co. at Kent, Ohio, reports sales for the year ending Oct. 31 were \$6,598,000, being 95 per cent greater than last year, and the net earnings amounted to \$524,000. The company reports its stock on hand in factory and branches to be less than normal. Sales which have gradually declined until October have since gone steadily upward, and it is expected that January sales will be almost normal. The stockholders have voted to change the ending of the fiscal year to Dec. 31, and officers for the ensuing year elected are as follows: Presi-

dent, O. M. Mason; first vice-president, R. W. McKinnon; second vice-president, John H. Diehl; secretary, W. A. Cluff; treasurer, D. M. Mason.

Bank Credits

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

NEW YORK, Dec. 23—The large scale operations in connection with tax payments and Liberty Bond interest payments went through last week with only slight effect on the money market. Call money was plentiful and ruled at 7 per cent, with a range of 6 per cent to 7 per cent. The same rates were quoted the previous week.

Time money held firm until the Dec. 15 disbursements. After these payments there was a slight easing of rates, with nominal quotations, however, at 7 per cent to 7½ per cent for sixty and ninety day paper secured by mixed collateral, as against 7½ per cent to 7½ per cent the week before. Rates for four, five and six months' paper were quoted at 7 per cent, as against 7 per cent to 7½ per cent the week previous. All-industrial loans were contracted for at about ¼ per cent higher than the rates on loans secured by regular mixed collateral.

The excess reserve over legal requirements of the New York Associated Banks last week showed a decline of \$3,025,710 from the previous week's excess reserves of \$11,247,910. Loans increased \$115,576,000, the first increase reported since Oct. 16, and net demand deposits increased \$12,454,000. Government deposits at \$188,064,000 compare with \$8,408,000 a week ago.

There was little change in the reserve position of the New York Federal Reserve Bank, as shown by the week-end statement. While total bills on hand declined \$69,997,000, and total earning assets \$21,635,000, total cash reserves also declined \$15,513,000, and Federal Reserve Notes in circulation in this center increased \$7,962,000.

The Federal Reserve banks as a whole showed a marked improvement in reserve position last week. Cash reserves increased \$22,061,000, while there were declines in bills discounted secured by Government war obligations of \$10,270,000, and in total bills on hand of \$130,171,000. Total earning assets declined \$92,908,000, and net deposits \$107,707,000. Federal Reserve notes in circulation increased \$32,490,000, and total gold reserves increased \$19,097,000. As a result, the ratio of gold reserves to Federal Reserve notes in circulation, after setting aside 35 per cent against net deposits, increased from 49.2 per cent (the week before) to 50.5 per cent last week. This is the highest since Jan. 30, 1920, when it was also 50.5 per cent.

The liquidation in commodity prices was less marked last week, although curtailed production, particularly in the metal trades, and wage reductions in the clothing trade reflected a lack of confidence felt in some quarters in an immediate improvement in business outlook.

MEN OF THE INDUSTRY

W. L. Carver has been appointed general manager of the Antigo Tractor Co., dating from January 1. He was formerly general manager of the Mid-West Engine Co., Indianapolis, and before that was with Wallis and Moline Plow. B. W. Keene of Oshkosh will be a member of the production department.

L. Logie, formerly general sales manager of the Chalmers-Maxwell cos. for Canada and recently associated with tractor interests in Toronto, has been appointed district supervisor for Canada for the Liberty Motor Car Co. E. G. Soward has been made special district supervisor for the West-Central states.

Edward S. Babcox has acquired a substantial interest in the India Rubber Review, which for twenty years has been an authority in the rubber industry. The company has been reorganized so that Theodor E. Smith, formerly sole owner, is president, and Babcox vice-president.

Max E. Loomis, formerly with the Reo Motor Car Co., has been made advertising manager of the Sparks-Withington Co. of Jackson. Major Henry L. Hunt, whom he succeeds, has returned to the newspaper game as editorial writer on the Jackson News.

A. R. Erskine, president of the Studebaker Corp., has been re-elected a Class B director of the Federal Reserve Bank of Chicago. He has just completed his first year of service and now has been honored with a three-year term.

A. R. Johnson has been appointed assistant sales manager of the Auburn Automobile Co., supplementing the work of J. I. Farley, vice president in charge of sales. Johnson was formerly with Cadillac and Hyatt.

N. S. Beebe, who handled the financing of the Northway Motor Co., Boston, and previously with the Templar Motor Co., has become associated with the Kelsey Motor Co., Newark, N. J., as a financial executive.

Earl E. Harrington has begun service as general superintendent of the Delton Tire & Rubber Co., Baltimore. His last service was with Goodyear in the technical service division of the development department.

R. B. Merrill has disposed of his holdings in the Detroit Motor Parts Co., and in the future will devote his time to the Atlas Machine Works, of which he is secretary and treasurer.

T. S. Merrill of Detroit, secretary of General Motors Corp. has been designated Michigan representative of the Corporation, according to papers filed in Lansing in accordance with the state laws.

W. H. Mooney, sales engineer of the Dayton Engineering Laboratories Co., has been appointed assistant sales manager of that organization, starting Jan. 1.

M. M. Friede has been made sales manager of the Disco Electrical Manufacturing Co., to succeed A. C. Hyser.

C. L. Mason has been appointed sales manager of the Denman Myers Cord Tire Co., with general offices at Cleveland.

Lon R. Smith has been elected vice-president in charge of sales and advertising of the Mid-West Engine Co., Indianapolis.

HANSEN & TYLER ASSIGN

FORT DODGE, IOWA, Dec. 20—Hanson & Tyler, one of the largest distributors in the State, have made voluntary assignment in bankruptcy. No formal statement of the financial condi-

tion of the firm has been announced although accountants are engaged now in the check. It is estimated that assets will be \$1,317,230 and liabilities \$830,000. Annual business of the company amounted to more than \$2,000,000. Its present condition is attributed to tight money and refusal of banks to handle automobile paper. The firm maintained headquarters here with five branches in Des Moines, Omaha, Webster City, Sioux City and Sioux Falls, S. D.

Erie Seeks Capital
to Effect Merger

SANDUSKY, OHIO, Dec. 21—The report of the stockholders' committee investigating the affairs of the Erie Tire & Rubber Co. shows current assets and inventories valued at \$1,969,479.48, fixed assets \$688,555.07, and deferred charges of \$1,955,527.50. Liabilities, current and accrued, total \$225,241.84.

Analysis of the current assets shows cash balances, \$10,240.77; accounts receivable, \$813,740.94; notes receivable, \$54,531.84, and accounts receivable upon capital stock, \$631,436.17. Inventories total \$458,579.76, and cash balances, \$10,240.77.

Plans to merge the company with others in a new corporation are under consideration, the committee announced, but before this can be done debts must be liquidated and working capital supplied. This would require \$2,500,000. With this supplied the merger would be put through and new officers elected to head the new corporation.

Companies which would be linked with the Erie company in the proposed merger are said to be the Stanwood Rubber Co., Elizabeth, N. J., and the Hardman Rubber Co., New Brunswick, N. J. Both of these are in the hands of temporary receivers owing to lack of working capital. Extensions of time were recently given them to work out merger plans.

TO ACT ON CLASSIFICATIONS

NEW YORK, Dec. 21—The consolidated classification committee of the National Automobile Chamber of Commerce will meet at 143 Liberty Street, this city, on Jan. 10, and at the Transportation Building, Chicago, on Jan. 17, to consider proposed changes in classification on body and top irons, engine hoods, steering gear assemblies, axles and radius rods. Members whose shipments would be affected by changes in classification of any of these items are requested to inform the committee.

TO MAKE ANTI-LEAK PRODUCT

BINGHAMTON, N. Y., Dec. 21—The New-Metal Products Corp. has been organized here to manufacture a product designed to mend leaks in metals without the use of heat. The company will take over the business formerly conducted in New York. Officers of the new company are: Fay E. Spawn, president; Archibald Howard, vice-president, and H. H. Hathaway, secretary and treasurer.

INDUSTRIAL NOTES

American Autoparts Co., Detroit, has completed its first manufacturing unit, a chassis spring plant, representing an initial investment of \$3,000,000, and is entering full operation. Officials of the company are W. E. Perrine, president; F. F. Grimmelsman, vice-president and general manager; W. P. Culver, vice president and sales manager, and J. W. Stannard, secretary and treasurer.

Detroit Steering Wheel Corp., Detroit, has been taken over by the Tiltlock Steering Wheel Corp. W. F. Fiedner, general manager, will be in charge of the new company. He also is general manager of the Disco Electrical Mfg. Co. The Company makes steering wheels for a number of the larger automobile companies.

Rolls-Royce of America has closed its Springfield, Mass., plant for two weeks, affecting between 500 and 600 employees. It is declared the shut-down is for inventory purposes and no wage reductions are contemplated.

Acme Universal Joint Mfg. Co., Kalamazoo, has been absorbed by the Hartford Automotive Products Co., and its name will soon be changed. The main office will be moved to Hartford.

Stromberg Carburetor Co. closed its Chicago plant December 20 and will continue closed to January 3. It is now employing four men four days a week. Normally it has a working force of 400.

Jenckes Spinning Co., Providence, has closed down in most departments until January 3. Employees were asked to turn in their pay checks.

Automotive Products Co., Cleveland, has changed its name to the Auto Accessory & Engineering Co.

United Automotive Body Co. will take over the output of the Champlon Wagon Co., Owego, N. Y.

TO BUILD \$1,000,000 PLANT

ATLANTA, Dec. 21—Officials of the International Steel & Motors Corp. have definitely announced that Atlanta will be the headquarters of the company and that a plant will be constructed near Rome, Ga., to manufacture a line of general steel products, primarily automobile parts. The corporation was organized some months ago with \$10,000,000 capital. The new plant is to cost about \$1,000,000. It will not be ready for operation before the spring of the coming year, according to K. L. Jones, of Atlanta, a stockholder and director of the company.

When the company was organized it was planned to manufacture only automobile and motor parts, but it has since been decided to turn out a general line of steel products. The company will operate its own iron ore mines in Georgia.

FIRESTONE CONNECTS PLANTS

AKRON, Dec. 20—The Firestone Tire & Rubber Co. of Akron will have its own railroad system connecting all factory units starting in February. The work of laying track is now proceeding with the co-operation of the trunk line railroad whose lines run parallel to the Firestone factories.

Calendar

SHOWS

- Jan. 3-8—New York, Motor Truck Show, Motor Truck Ass'n of America, Twelfth Regiment Armory.
- Jan. 8-15—New York, National Passenger Car Show, Grand Central Palace, Auspices of N.A.C.C.
- Jan. 10-17—Portland, Ore., Annual Automobile Show, Automobile Dealers' Ass'n, Municipal Auditorium, M. O. Wilkins, Mgr.
- Jan. 15-29—Philadelphia, Annual Automobile Show, Philadelphia Automobile Trade Ass'n.
- Jan. 17-23—Milwaukee, Annual Automobile Show, Milwaukee Automotive Dealers' Ass'n.
- Jan. 22-27—San Francisco, Second Annual Pacific Coast Automotive Equipment Exposition, Auditorium.
- Jan. 22-29—Baltimore, Annual Automobile Show, Baltimore, Automobile Dealers' Ass'n, 5th Regiment Armory, J. C. O'Brien, Mgr.
- Jan. 22-29—Cleveland, Annual Passenger Car Show, Cleveland Mfr's & Dealers' Ass'n, Wignmore Coliseum.
- Jan. 22-29—Montreal, Annual Automobile Show, Montreal Automobile Trade Ass'n, Motordrome Bldg.
- Jan. 29-Feb. 4—Chicago, National Passenger Car Show, Coliseum, Auspices of N.A.C.C.
- Feb. 5-12—Minneapolis, Annual Automobile Show, Minneapolis Automobile Trade Ass'n.
- Feb. 6-12—Columbus, National Tractor Show, Columbus Tractor & Implement Club, Ohio State Fair Grounds.
- Feb. 12-19—Hartford, Conn., Annual Automobile Show, Hartford Automobile Dealers Ass'n, Armory, Arthur Fifoot, Mgr.
- Feb. 12-19—Kansas City, Annual Automobile Show, Kansas City Motor Car Dealers' Ass'n.
- Feb. 14-19—St. Louis, Annual Automobile Show, St. Louis Automobile Mfrs & Dealers' Ass'n, Robt. E. Lee, Mgr.
- Feb. 14-19—Winnipeg, Western Canada Automotive Equipment Show.
- Feb. 18-28—San Bernardino, Cal., National Orange Show, Fred M. Renfro, Mgr.
- Feb. 19-26—San Francisco, Fifth Annual Pacific Automobile Show, Exposition Auditorium, George Mahlgreen, Mgr.
- Feb. 21-26—Louisville, Annual Automobile Show, Louisville Automobile Dealers Ass'n, First Regiment Armory, C. L. Alderson, Sec'y.

- Feb. 21-26—Salt Lake City, Annual Automobile Show, Intermountain Automotive Trades Ass'n, W. D. Rishal, Mgr.
- Feb. 26-Mar. 5—Buffalo, Annual Automobile Show, Buffalo Automobile Dealers Ass'n, 74th Regiment Armory, C. C. Proctor, Mgr.
- Mar. 2-10—Des Moines, Annual Automobile Show, Coliseum, C. G. Van Vliet, Mgr.
- Mar. 5-12—Brooklyn, Annual Automobile Show, Brooklyn Motor Vehicle Dealers' Ass'n, 23d Regiment Armory, George C. Lewis, chairman.
- Mar. 7-12—Syracuse, N. Y., Annual Automobile Show, Syracuse Automobile Dealers Ass'n, Armory, Howard H. Smith, Mgr.
- Mar. 7-12—Indianapolis, Annual Automobile Show, Indianapolis Automotive Trade Ass'n, Automobile Bldg., State Fair Grounds, John Orman, Mgr.
- Mar. 12-19—Boston, Annual Automobile Show, Mechanics Bldg. and South Armory.
- Mar. 14-19—Omaha, Annual Automobile Show, Omaha Automobile Trade Ass'n, Inc., Omaha Auditorium, C. G. Powell, Mgr.
- April 4-9—Seattle, Annual Automobile Show, Seattle Motor Car Dealers' Ass'n, Arena Hippodrome.

- April—Chattanooga, Tenn., Spring Automobile Show, Chattanooga Automotive Trade Ass'n, Sunday Tabernacle, C. A. Noone, sec'y.

FOREIGN SHOWS

- Jan. 7—Sydney, Australian Motor Show.
- Jan. 22-29—Colombo, Ceylon Motor Show.
- Feb. 7—Delhi, India, Delhi Motor Show.
- Mar. 23-29—Witwatersrand Agricultural Show including machinery and motors sections.

CONVENTIONS

- Dec. 28-30—Chicago, Annual Meeting American Society of Agricultural Engineers.
- Jan. 7—New York, Advertising Managers Council, Motor & Accessory Manufacturers Ass'n.
- Jan. 11-18—S. A. E. Annual Meeting, New York City.
- Feb. 2-4—Chicago, First Annual Meeting, Automotive Electric Service Assn. Hotel La Salle.
- May 4-7—Cleveland, National Foreign Trade Council.
- Oct. 12-14, 1921—Chicago, Twenty-Eighth Annual Convention National Implement & Vehicle Ass'n.

Good Roads Congress Works for Co-operation

NEW YORK, Dec. 21—The Eleventh American Good Roads Congress and Twelfth Good Roads Show scheduled to be held in Chicago, Feb. 9 to 12, by the American Road Builders Association, will be the most important of the series. With 1921 to usher in the most active era of road building the country has known, the association is endeavoring to link all persons interested in highways into the closest co-operation.

Such topics as "Better Methods and Materials in Road Construction and Maintenance," "Highways as Railroad Feeders," "Road Finance," "The Powers and Duties of Highway Officials," "The Use of Convict Labor on the Roads," "Types of Roads," "Testing Materials," "Improving Rural Marketing Conditions with Better Roads," "Good Roads as a Means of National Defence," "Truck Transportation," "Problems of Road Construction," "The Use of Tractors," "Road Legislation," "Highway Specifications," "Bridge and Culvert Construction," "The Good Roads Movement," and "State and Government Aid," will bring together for an exchange of views large numbers of highway officials and engineers, congressmen and legislators.

FENN TALKS TO BREEDERS

SYRACUSE, N. Y., Dec. 17—F. W. Fenn, secretary of the motor truck committee of the National Automobile Cham-

ber of Commerce, discussed motor truck transportation on the farm, at a meeting of the New York State Breeders' Association here yesterday. Many of the breeders who attended the meeting already use motor trucks, and several of them told Fenn they would be unable to meet modern agricultural conditions without the use of motor vehicles.

Dirigible Operation Laid Over for Time

AKRON, Dec. 18—Ralph Upson, the only American to win the James Gordon Bennett international balloon race trophy, and until recently chief aeronautical engineer of the Goodyear Tire & Rubber Co. has abandoned, temporarily at least, his plans for formation of a large aeronautical syndicate for the manufacture of dirigibles and control and operation of inter-city passenger and express dirigible service. Upson upon leaving Goodyear two months ago, stated that at that time he had under definite consideration a proposal which it is understood came from a group of prominent men who were ready to provide ample financing, to launch such a dirigible project, and to devote his time to the perfection of an entirely new and more feasible type of lighter-than-air craft.

The current financial and business depression has resulted in deferment of all such plans. Upson is now in Washington in the capacity of consulting aeronautical engineer for the government, in assisting the navy and war departments.

Motor Boat Experts Address S. A. E. Section

NEW YORK, Dec. 18—A motor boat meeting and dinner of the Society of Automotive Engineers was held at the Automobile Club of America this week. Vice-president C. A. Criqui presided. The speakers at the dinner were William W. Nutting, who told of his experiences in twice crossing the Atlantic in a 45-ft. boat; William B. Rogers, Jr., who spoke on standardized motor boats, and Henry R. Sutphen, who emphasized the need of maintaining an American merchant marine and commended the society for its motor boat standardization accomplishments.

Following the dinner a professional session of the society was held. Lieut. Commander H. Gibson, U. S. N., was the first speaker. He gave some additional and very interesting data on German submarine engine construction, supplementing similar data presented at previous S. A. E. gatherings. A second paper, entitled "The Commercial Motor Boat and the Diesel Engine," by G. C. Davison, was read in the absence of the author. The final paper of the evening dealt with the standardized motor boat, and was presented by William Deed.

During the afternoon preceding the meeting the metropolitan section of the society entertained the Pennsylvania section at luncheon, after which both sections visited the plant of the Consolidated Ship Building Corp. at Morris Heights.

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The Right Method of Selling Cars on a Buyers' Market

The ideas gathered under this heading are intended to be helpful to those who have been caught un-awares by the changed conditions. They are based solely on a consideration of the mass selling system.

By Clyde Jennings

IT is, of course, admitted that the problem of motor vehicle sales is entirely changed. From a sellers' market, it has turned to a buyers' market. This puts before the manufacturer a problem which has not seriously concerned him for several years and one that he did not expect to confront for another year or two. In the main, manufacturers admit that they had not reached a conclusion as to how they would handle the problem when it arrived. We have talked with several sales managers within the last few months who were contemplating the situation, which they regarded as being in the future. The plans of these men were not reduced to anything like detail.

The manufacturer is confronted only with the problem of mass selling. He does not and cannot sell his product in single units. He does not come into direct contact with the public. His customers are his dealers and his duty, in creating a demand, is to his dealers.

Consequently, his first problem is that of forming a dealer organization. This organization must be the outgrowth of a careful consideration of the number of units to be produced; the territory over which they can be marketed with profit to himself and the dealer. This is a considerable problem and it is not the intent to make it the subject of this article.

His second problem, which becomes important as soon as the first has been outlined, is that of creating

a sentiment or a demand for his particular product.

This problem quickly resolves itself into two distinct branches:

1. The trade appeal, to the buyer, which will include the obtaining and proper influencing of the men who are to become dealers, or who already are factors within the trade who might be called upon to speak well or ill of the product.

2. The general appeal to the user, who lives in the communities where the dealers are located. The user is not a direct customer of the manufacturer, but the custom of the trade has created a sentiment that the manufacturer should do much of the work of creating the user demand, even to the extent of printing advertisements in newspapers to bolster sales in weak spots. The entire financial arrangement of the trade, fixed by the distributor and dealer discounts, is based upon this method.

Consequently the burden of the advertising is placed upon the manufacturer. Whether that is as it should be, is not the object of this discussion. The question of dealer allowance for advertising has been discussed within the trade, but there is no settled practice and, we can say, really no average practice. Neither is there a basic idea of the percentage of retail price used for advertising, as in some other lines of trade. The entire advertising problem appears to

be an open one. With this general premise, we are endeavoring to offer some thoughts as to the advertising of motor cars, which are the prominent item of our trade as far as advertising goes. The remarks will, in a general way, represent ideas on truck advertising as well.

It is no secret that the spending of the advertising appropriation will be along very different lines from that of the last few years. The premises by which this conclusion is reached are sufficiently well known as to need no further discussion.

It is very true that many manufacturers and some sales managers approach the advertising question with a feeling that there is something mysterious about it. Very few men have ever stopped to carry advertising back to its primary statement. If they would do this, much of the mystery would disappear. One of the men who helped materially to make advertising a real business gave this definition.

"Advertising is making a good impression on the prospect."

With this statement of the purpose of advertising as a means to mass selling, it might be well to state on what basis the success can be measured. Here are two expected results that can be used as a measure. Advertising should

- A Lessen the cost of sales.
- B Increase sales.

Now if the manufacturer will consider this simple and basic statement of the purpose of advertising and how it may be measured the mystery will be eliminated.

The problem then remains as to how to make this impression. Several questions suggest themselves in this connection. If they are answered, the problem is about solved. Let us list the more important questions:

1. Who are prospects?
2. Where are the prospects located?
3. Do they read; if so, what and why?
4. If they do not read, who reads for them?
5. In case of the motor car purchase, who has the greatest influence?
6. What do the prospects want to know about my car?
7. What do I want the prospects to know about my car?
8. Are the former buyers still buying?
9. Why did I make the car, anyway?

With the answers of these questions at hand, the dealer layout completed, and the amount of the appropriation fixed, it should be comparatively easy to settle the entire question of advertising. But these questions are a serious factor, and to answer them hypothetically is the object of this article. So let us take them up in order.

1. Who are the prospects?

There are two, of course, dealers and the users. The dealers are the first and immediate prospects of the manufacturers. No matter whether he is a new manufacturer, or an old manufacturer merely changing models or prices, or a manufacturer seeking to sustain the respect of a continued model, he has a distinct problem to present to his dealer prospect.

While reaching his dealer, he must also reach the influences that bear heavily on the dealer, in other words, his competitors and associates. Also he must counteract the influence of rival manufacturers. It might be an axiom that a dealer can sell a car only as he is sold on it himself.

This dealer element often is overlooked by manufacturers. In fact, we believe that most manufacturers

overlook the necessity of selling the influences that are brought to bear on the dealer. Some way they appear to consider that once a dealer signs a contract to sell a car that it naturally follows that he remains an enthusiast for that car and that he will influence his own surroundings. A good guess is that such dealers are rare.

The other prospect is the user. The manufacturer seeks to influence the user because it is of profit to himself to send the prospective user to the dealer partially or entirely sold on the car he makes. There may come a day when the manufacturer will content himself with advertising to the dealer and will let the dealer handle the user advertising on his own account. That is done in some lines of merchandise with less waste than would accrue through the handling of user advertising from the factory. Especially is factory advertising likely to result in waste when a car lacks national distribution. The user prospect can also be classified by the price of the car and the medium selected to fit the case.

2. Where are the prospects located?

This question should be answered definitely. First outline the territory in which dealers are to be located. Then outline that territory in the advertising put out to develop the dealer organization. So it should not be hard for any straight thinking factory sales organization to answer this question.

Next, the user prospects live in the same communities as the dealers. This must follow, just as day does the night. The most absurd thing I have noted during the past year of advertising absurdities was an advertisement in a publication of 10,000,000 (more or less) readers. The advertisement was of a very moderate priced car, made in a factory that could not possibly produce more than 2500 cars a year. Just think of it!

One car, priced somewhat lower than this one, has 4000 dealers in this country and we know that their distribution is not really and truly national, although it might be said to be practically national. A comparison of national advertisers with production would be amusing in many instances if it were not for the appalling economic waste. For economic results, the circulation used must be fairly confined to the localities where the cars may be bought.

It is true that cars have a tendency to wander into other localities, and that brings up a question that we will take up later.

Carrying to completion the idea that the manufacturer needs advertising in the general media for national advertising, then it must follow that he needs all such media. The line of distinction between such media is very thin.

3. Do the prospects read; if so, what and why?

It is pretty well conceded that the prospects of both classes read something, but the question is what and why they read.

It seems that in the past few years advertisers were obsessed with the idea that everybody read nearly everything and at least everybody read one medium.

Recently an advertising manager of a concern that comes within our industry told his fellow advertising managers that 43 per cent of his dealers read his advertisements printed in a general medium. This sounded pretty good for this medium but later, in the round table discussion, he said that it had required three years of hard, expensive work for him to attain that average. And he remarked, "I will never undertake such a task again."

Now it happens that the dealers in this man's line are a progressive group, pretty well up with the times in their line. It is not hard to believe that this man could have picked a business paper that more than 43 per cent of

them read at the start. In fact, this man practically admits that this is true.

There has been a considerable success in advertising small articles and by this method creating a demand that has placed them on the shelves of general retail merchants. This success has led some car manufacturers to attempt the same thing. We could write into this story details of considerable wasted effort along this line. Motor car dealers, as a rule, are limited as to the number and makes of motor cars they can sell by their contracts for their major line, and it is not to be expected that, when some one drops in and asks for a Sennett car the dealer will order a few and put them in stock.

Now consider the user prospect. What publications does he read and why does he read them? Do you honestly think that the tired business man is going to read seriously and carefully an engineering advertisement when he is seeking relaxation in fiction? If a publication boasts openly of the number of lawyers and doctors who read the publication, is it reasonable to expect that these doctors and lawyers will go about and advise the husbands of patients or the patient, if he happens to be a man, to buy this or that truck because he saw it advertised in the paper that he reads?

There was a very popular book a few years ago entitled "Put Yourself in His Place." I do not remember much about the story, but I do recall the title and I have tried to settle many questions by putting myself in the other man's place. I have watched the women in my own home and those homes in which we visited, and questioned them as adroitly and innocently as I know how to learn why they read the papers and magazines. The results are not encouraging to the motor car advertiser. There was another book called "Looking Backward." Sometimes it is very wise to review the past advertising efforts and learn of direct results.

There are certain more or less accurate tabulations that tell where the people live who read certain publications and also what class of people read them. But why these publications are read is not tabulated. Think it over.

I once heard an advertising manager assert something like this: "Get on a parlor car train leaving this city on Thursday evening and you will find all of the men reading a single publication and reading chiefly the advertisements in it." I thought that a strange statement. The next evening being Thursday and as I was leaving that city on a parlor car train, I made the canvass. The name of the publication had not been mentioned, but I had a suspicion as to its identity. I saw one person reading the publication, and that was a girl. She was reading fiction. In two trips through the train I found serious-looking men reading material they were taking from portfolios more than any other single medium. This was on the later trip. On the first, they were reading the news pages of newspapers.

4. If they do not read, who reads for them?

Of course this means, if the prospects do not read motor car advertising, who reads it for them?

Honestly, we believe that few persons do read motor car advertising with the thoroughness that they are supposed to. We believe that what they read is chiefly suggestions and then they go to some one in the trade to get an interpretation of it. We believe that motor car advertising should be designed with this idea in view. It is not fair to expect that any single advertisement, or series of advertisements for that matter, will be entirely convincing to a novice. It would appear that the advertiser has it in his power to send the user to the dealer and then the dealer and his assistants must read the real

facts and pass them on to the user prospect in language that he or she can understand.

Did you ever stop in a garage long enough to hear the man who drives a car in for some repair call the garage man Jim and ask him what he thought of the Sennett car? Now how much reading was Jim doing for this man who probably was just then thinking of his next car? Jim might have answered from his own experience, but it usually happens that a man's experience is influenced by his information. If Jim knew all about the Sennett car before he started to repair it, his opinion would probably be very complimentary; if he knew nothing about it, he would have an awful time repairing it and would form a very adverse opinion.

The more you think of this question as to "Who reads for them?" the more interesting it becomes.

5. In the case of the motor car purchase, who has the greatest influence?

There was a period in the piano trade that the sale was decided by the fee handed to the music teacher, or by the music teacher's honest opinion. In other words, the music teacher was the greatest influence. That is not the case now. Financial terms first won the people from this practice and when that change came the dealers so strengthened their appeal that they to a large extent became masters of the field. It is worthy, perhaps, to note that piano makers are not exceptionally heavy national advertisers, but that the dealers employ many "bell ringers" or solicitors who are frankly hunting prospects in connection with much newspaper advertising, usually financed by the dealer.

The story as to influence on sales might well be a long one. We do not know exactly who can answer it, but we have heard some incidents recently that might indicate something toward this end. A man we know bought a car that has been quite popular west of the Alleghanies, but is little known in and near New York. His wife drove this car to the service station near her home in a New Jersey suburb. The service man, something of a power in that neighborhood, looked it over and remarked: "Looks like you paid enough for that carriage!" Imagine the tone of that remark and then what the woman thought! Really it was necessary to sell this service man on the car if it is to stay in that neighborhood.

It is quite evident, however, that few persons telephone an order to a salesroom for a car. Such cases are heard of, but you know from the spirit with which such incidents are told that they are entirely unusual. So it must reasonably be concluded that the dealer and his staff have quite a good deal to do with the sale of the car.

Once I heard a salesman speak very severely of a rival car that I thought deserved better words. After the customer was gone I asked him if he was not a bit hard on the car. He answered that he "didn't know anything about the car, as it never advertised. If the makers are ashamed of the car, why should I stand up for it?"

The truth is that this car was quite well advertised, but not in the papers which this salesman read. His reading was almost entirely confined to trade papers and newspapers. His idea was that if the makers of the car were ashamed to tell what was in their car, he had the privilege of taking liberties with his description. Not the right spirit, you will say. But it is a condition, not a theory.

There are other factors to be considered which might be included in the advertising idea. I once knew a dealer who was about the most disagreeable man I can

recall. He exerted himself to be disagreeable to his fellow dealers. But he was a wonder on service and he had working a system whereby most of his owners left their cars at his service department for inspection at regular intervals. It was the best thing of the kind in that town, but he got no recognition for it in the dealer circles. Instead, when driving a prospect about, the salesman would point to the line of cars outside this service station and say: "You see what happens to — cars." There came a time when this man kicked himself out of the dealer organization of his factory. His successor radiated good fellowship and within a month the finger of scorn was no longer pointed to this line of cars waiting for inspection.

Did you ever think well on how closely the social position of the purchaser is connected with the car? If you happen to be invading a new sales territory with your car, especially if it is priced to appeal to most liberal buyers of that community, you must realize that your advertising in that community must justify the purchase for the family. It is especially important that the lady of the house feel entirely contented with her purchase. She will not pay \$5,000 for a car and then go out each afternoon and justify her purchase. When she puts that amount of money into anything she wants the name to justify it for her, practically to make her neighbors arch their eyebrows a bit when they hear the name of the car.

How are you going to do this? You must determine first what this particular set of people read. It always is a fact that the people of the "same set" in any community have a common reading medium. Perhaps it is the local society paper. In one community I know it happens to be a paper called "The Mirror." Few persons outside of that community know this paper. But the dealer who plans to invade the smart set of that community should know it. This particular paper is well conducted. Its advertising appeal is honest. Its managers know well their sphere and they demand pay, not for the space or for the circulation, but for their reader influence. There is, likely, no other single paper that circulates so universally in this especial circle.

These are merely suggestions as to the ramifications of "influence." How to make the best use of this influence is sometimes called an open question. Frankly, we do not believe that it is. We think the answer is to properly use the publications that reach and affect this influence. Use it in an educational way. Talk to dealers and garage men as though they knew something about your product, not in the language used to reach the prospective owner. These men likely know the defects of your product, so when you overcome a difficulty why not say so? Talk dealer points to the dealers, service points to the garage men, user points to the user.

6. What do prospects want to know about my car?

The best answer to this question is indicated by the questions asked of the salesmen when they talk to prospects and by the part of the sales talk that has the most effect in swinging sales. Base your consumer copy on these points. If most people want to know if this car will take them to the beach in swimming clothes, by all means tell them that it will and print such pictures. But if the people want to know how fast it will go, its normal speed, what is the cost of upkeep and about the service you are going to render, by all means give them this information. If they want to know how many miles or years compose the average life of your car, tell them that from your records. If you are appealing to women who buy a car to uphold their social position, tell them

of the intimate adornments, the upholstery, etc. By all means let them have the points on which they can justify the purchase for the purpose for which the car was bought. Also let their friends know these facts.

7. What do I want prospects to know about my car?

Certainly there are things about your car that you want the public to know. Tell them these facts. You know best what they are.

8. Are the former buyers still buying?

If we did not have anything else to put into this number of AUTOMOTIVE INDUSTRIES, it could easily be filled with this discussion. It means just this:

Are you going to keep on buying new customers for every car you make, or is each car you make going to be an asset? If the cars you have made cannot be listed as assets, they become liabilities. There is no neutral ground.

Every car turned out should be a contributing asset during its entire life. As long as it is listed in the State registration list, the man who buys the plate should be paying your organization real money for service earned. Every car that you send out should become, in time, the source of sales for parts and service to a satisfied customer. Of course this owner should get a period of perfect service, but no reasonable owner will expect a car to run forever. He expects sooner or later for some of the parts to give way and he will be glad to replace them at the right price—a price that means a profit to you and to your agents. If you have 100,000 cars running, you should have a nice business in keeping those cars running.

An automobile should be a very fine sort of an advertisement. Every once in a while a man hires an automobile and puts a sign on it to advertise a meeting, or a bargain sale. At the same time he is advertising the automobile.

This idea assumes that it is a good automobile and has been well serviced. If it is not a good automobile and has not been well serviced, then it becomes a liability.

A few years ago the player piano dealers of a Western city held a meeting to talk over employing a man to run a central store to sell music rolls to the owners of the instruments they had sold. They called in a young man who had experience selling talking machine records. He listened to their plan, then said, "Why hire a man? I'll take it over and pay you all to stay out of the business for ten years." This thought was so startling to most of those present that they went home to think it over. As a result of the suggestion each piano house put in a music roll department. The profits from one such department the second year after this meeting reached five figures. A few motor car concerns have properly promoted their service departments, but not many of them.

It is going to be mighty expensive to some car makers to buy new customers if the former owners are all turned into knockers. Use advertising copy to make the former buyers all boosters. Remember always, that a good many people think what they are told to think.

9. Why did I make the car anyway?

I used to think that every man who built a car had some specific reason for doing so; that there was something about his car that he did not believe the others had. Lately, I have come to doubt that all cars are founded on a specific reason. Perhaps some are just cars because the maker believed that he could sell a vehicle. If you cannot answer this question pointedly, it would be interesting to know why you are in business.

The motor car business has been through a considerable strain since 1914, and the one big point that I see in all of this is the necessity of the manufacturers to justify their vehicles as a necessity. Really, when the big fuss began I could not see why any one should question that "transportation" was a necessity. But they did! It became a condition, not a theory.

We want to pay our compliments to the men who presented this defense in Washington and in other places. But while this work was going on, there were a number of stay-at-homes, who sat in their offices and devised advertisements that reduced all of the arguments made in Washington to "scraps of paper." Now the industry is confronted with the serious questions of added taxes.

Are these same slackers going to stay at home and write "pleasure" car ads while the real leaders of industry fight in Congress to establish the necessity of the best means of transportation ever offered to the public!

Cars should be advertised in their best use. We admit that cars are a necessity, why not sell them as such?

E. C. Tibbitts, advertising manager of the B. F. Goodrich Rubber Co., is on record as saying to the Advertising Managers' Council of the M. A. M. A. the following:

We are not getting out of the car one-half, not even one-fourth, of the real utility that is in it. Here is a willing slave, as wonderful as the magic of Aladdin's lamp, a saver of time, annihilator of distance, a destroyer of drudgery, and here we are hesitating, still gaping at the wonder of it, hardly realizing the miracle of it, and not really beginning to realize or utilize the full value of it.

I, personally, would appreciate reading an advertisement that would really wake me up to the utility of the automobile. I don't get anything like the real value out of this remarkable servant of mine. I'd like to see an advertisement right now which would feature the many and diversified things the man or woman can do with an automobile, the usual things and the unusual things, and the thousands of things that a car can do for a man or woman.

I would like to see advertising that would picture an automobile in its diversified uses.

I would like to see an advertisement featuring a machine in which the busy business man is hurrying to catch a train.

I would like to see an advertisement picturing a housewife as she meets her friend at the railway station.

I would like to see the housewife depicted as she goes to market in her machine.

I would like to see the family represented buying produce direct from the farmer.

I would like to see the young man in a snug roadster with his best girl driving over the moonlit roadway.

I would like to see advertising that would feature touring in all its wondrous beauties, the automobile at the side of the stream, its owner fishing; an automobile beside a lake, the canoe in the distance; an automobile hunting scene; the whole family in a camping scene with the automobile in the foreground—these and a hundred other pictures that would lend some idea of the untold utility of the automobile.

I would like to see an automobile plowing through the snow, the street-cars stalled.

I would like to see advertising picturization of the various uses of the automobile on the farm. Why, you could take the camera and get the setting of a dozen advertisements in almost any rural part of America in a day.

I am not saying that all this hasn't been done. It has, but only in a limited way. What I want to see is automobile advertising as a whole turned in the direction of automobile utility, for my theory is that charm and beauty and reliability and luxury in themselves already have been pretty well sold. Keep on selling, but why not stress utility in every advertisement?

Is this idea worth considering?

Just a few words about advertising as a general proposition. We have said in this article about a social publication that its owners charge for the influence, for the entry that they give their advertisers to their special circle of readers. I will say, further, for them, that they are jealous guardians of what they present to that circle. The ability to pay the bill is not by any means the qualifications for advertising in that paper. Their platform is about this, as I recall it:

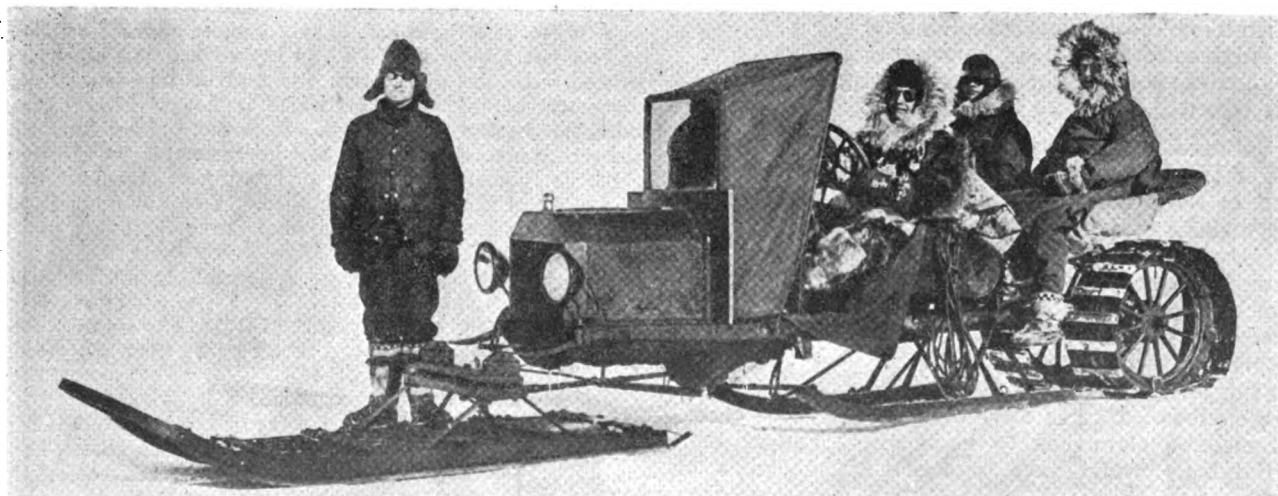
The firms and product must be honest.

We must be convinced that it will be profitable to the advertiser.

We must be convinced that they will treat our subscribers as well as we treat them.

This may be considered by some as a high handed proceeding, but it is the spirit of the better advertising, the real advertising that is making an actual business out of advertising. There are still in the business a few of the old space buyers and space sellers, but they are getting fewer daily. The good advertising business men realize that they are selling the influence of their publications and that this influence is a thing to be carefully guarded, much like the good will of an old, established business; the reputation of a lawyer, an engineer or a doctor.

If you think well of your car, be careful in what publications you advertise it. Some advertising is merely notoriety.



One of the many uses to which a modified Ford can be put. A motor driven sleigh adapted for use in Alaska

More Results of Tractor Tests at Nebraska

Of sixty-six tractors tested, eight have increased their rated engine speed, six lowered their horsepower rating, fourteen changed some item of equipment and three withdrawn. Most makes have met requirements, but extravagant advertising claims are a subject of just criticism.

THERE seems to be some difference of opinion among tractor manufacturers regarding the value of the official tests which a tractor must pass before it can be placed on sale in the State of Nebraska. Some very uncomplimentary things have been printed about the tests, and one maker especially has complained bitterly that the brake tests are made in a room where the air is vitiated by burnt gases and therefore not capable of burning the same amount of fuel, per cubic foot, as the pure air in the open fields.

On the other hand it will be observed that practically all of the well-known makers of tractors have entered their machines for the tests. Most of them have been fully able to meet the requirements and have suffered no other humiliation than having some of the braggadocio in their trade literature pointed out.

As far as the official tests are concerned, there can be no doubt that they serve a useful purpose, not only to the farmer but to the manufacturers as well. Many of the smaller manufacturers do not have the equipment necessary to accurately test their tractors for drawbar and belt horsepower, and the Nebraska Experiment Station affords them an opportunity to have these tests made at a nominal expense. In a way such firms are at a disadvantage in entering their machines for the tests, because they have to assume the risk of failure, whereas large firms fully equipped with testing outfits know in advance exactly what showing their machines can make.

Tests Producing Good Effect

We are informed that these tests have already had an important effect on commercial and engineering practice in the tractor industry. Thus, after sixty-six tractors had been submitted to tests, the makers of

1. Eight increased their rated engine speed.
2. Thirteen lowered their horsepower rating.
3. Fourteen changed some item of equipment and
4. Three withdrew.

This indicates that, as originally submitted, more than one-half of the tractors did not come up to their ratings. This can in some cases be explained on the assumption that the makers were not in possession of the apparatus necessary to test their machines themselves. No doubt as a result of their initial failure in the official tests many of the makers resolved to install such apparatus in their plants so that in future they can determine the capacity of their tractors for themselves.

From the farmer's standpoint the advantages of official tests are obvious. He has absolutely no means of checking the maker's claims as to horsepower, and without the official tests would have to accept these claims on good faith.

On the whole the tests should help the tractor indus-

try, because it will increase the faith of the buying public in that industry. This is on the assumption that the tests are carefully and honestly made, and we give the tractor industry and its representatives credit for sufficient intelligence to enable them to discover any possible causes of error and to insist upon its elimination. On the other hand, the tests were instituted specially for the benefit of the farmer, and his end is undoubtedly well looked after.

Another feature of the official supervision of the tractor trade in Nebraska is the censorship or criticism of general statements or claims in trade literature. One may feel inclined to smile at this, as it has been the practice of advertising writers from time immemorial to make a liberal use of superlatives and not to worry about proof of their assertions. However, the abuse has probably been carried to extremes in agricultural advertising, on the assumption that the farmer would swallow it all, no matter how exaggerated the claims. The institution of censorship in Nebraska may be regarded as a rebellion of the farming population of that state against such treatment.

In the table herewith are given condensed results of tests on twenty more tractors, and we reprint also the comments on the advertising literature of the makers.

The following together with the data printed in *AUTOMOTIVE INDUSTRIES* for Sept. 2 completes the record of the tests thus far reported. Test data have been released for publication only by consent of the manufacturer concerned.

Test No. 15—Minneapolis 35-70. In the advertising literature submitted with the application for test of this tractor we find some statements and claims which cannot be directly compared with the results of this test. It is our opinion that none of these statements or claims are unreasonable or excessive.

Test No. 18—Fordson. Remarks same as for Test No. 15.

Test No. 22—Gray 18-36. In the advertising literature submitted with the application for test of this tractor we find some statements and claims which cannot be directly compared with the results of this test. It is our opinion that none of these statements or claims are unreasonable or excessive except the following: "To-day no tractor at any price excels it in quality of construction, simplicity of operation or durability. In all around usefulness and final economy it has proved its superiority."

"The Gray tractor requires no special equipment." (Referring to farm implements.)

"There is no give to any part of it." (The frame.)

"It is not possible to make better gears than are used in the Gray tractor."

"It (the drive chain construction) also gives a large bearing surface, so that all danger of wear or stretch is eliminated."

"This air cleaner by a dry process removes all the sand and dust from the air before it passes into the carburetor."

"The downward pull of implements . . . presses the wide drive drum on to the soil sufficiently to insure perfect traction."

Details of Tractor Tests Officially Conducted Under Nebraska State Law

No. of Test	Name and Model of Tractor	Belt Tests												Drawbar Tests						Oil Gal.-hr.
		Test at Rated b. hp. (2 hr.)			Varying Load Test				Maximum b. hp. Test (1 hr.)			Half Load Test			Rated Drawbar Load (10 hrs.)			Maximum Drawbar Load		
		hp.	r.p.m.	Hp-hr gal.	maximum		minimum		hp.	r.p.m.	Hp-hr gal.	hp.	r.p.m.	Hp-hr gal.	lb.	m.p.h.	Hp-hr gal.	lb.	m.p.h.	
					hp.	r.p.m.	hp.	r.p.m.												
15	Minneapolis 35-70	70.31	556	7.96	71.12	547.5	1.97	625	74.01	556	7.42	37.80	596	6.86	6910	2.10	5.32	10998	1.79	6.25-44
18	Fordson	18.16	993	7.32	18.70	1007	0.86	996.5	19.15	1014	6.38	9.32	1005	5.77	886	2.57	2.45	2187	1.60	3.75-34
22	Gray 18-36	30.46	958	5.83	30.67	948	1.94	1452	32.30	958	6.67	15.29	958	5.58	2703	2.73	4.48	3044	2.24	2.58-43
23	Titan 10-20	20.18	577	7.86	21.26	572.5	1.05	590	25.15	580	6.06	10.47	586	5.61	1827	2.04	3.31	2660	1.93	8-30
29	LaCrosse G12-24	24.23	899	6.56	24.31	896.5	3.04	1225	24.94	902	5.72	13.11	970	5.89	1859	2.75	4.76	2155	3.10	3-18
30	Aultman-Taylor 30-60	60.29	553	8.71	64.73	532	2.13	584.5	75.49	562	7.46	37.00	591	6.63	5184	2.54	4.97	9160	2.38	17.25-44
31	Aultman-Taylor 15-30	30.40	906	7.44	31.02	904	1.51	968	34.37	898	5.94	15.83	938	6.14	2497	2.36	3.91	2838	2.80	5-35
32	Aultman-Taylor 22-45	44.92	600	8.88	45.53	602.5	2.44	720	46.66	607	7.49	26.97	713	6.51	3723	2.46	5.92	4986	2.11	16.75-36
35	Coleman B 16-30	30.27	914	6.34	30.80	907	2.31	1125	30.41	907	5.32	18.07	1070	5.43	1961	2.92	2.73	2690	2.16	6-32
37	Parrett "K" 15-30	31.31	1015	9.04	31.76	1027	1.45	1108	31.79	1010	8.03	15.59	1006	6.40	2197	2.73	5.15	2988	2.63	5.25-54
39	Avery 6-cyl. culti.	14.08	1252	6.03	14.69	1250	1.70	1435	14.62	1246	6.12	8.09	1398	6.35	1216	2.17	2.79	1862	1.74	4.50-44
40	Avery 6-cyl. culti.	15.54	1243	6.22	15.72	1262	1.69	1950	15.77	1240	6.22	9.20	1469	6.59	1213	2.63	3.34	1674	2.01	3.75-32
41	Avery 12-20	20.18	804	8.98	20.79	796	1.59	847	24.26	800	6.38	10.59	843	6.19	2238	2.34	4.25	2608	2.53	6.25-30
42	Avery 14-28	28.16	901	8.24	28.03	874.5	2.06	958.5	31.83	898	7.63	14.22	918	6.29	2646	2.50	4.94	3049	2.65	7.75-33
43	Avery 25-50	50.40	702	7.91	51.56	691	3.12	895	56.86	712	8.05	25.33	710	6.33	3778	2.71	4.25	4415	2.67	10.50-32
44	Avery 40-80	65.73	612	7.26	66.26	615.5	2.92	678.5	69.23	597	8.41	36.56	679	4.89	7812	2.25	3.96	8475	2.21	12-39
45	Cletrac W 12-20	20.14	1276	8.33	21.30	1318	1.22	1359	24.94	1321	8.61	11.38	1406	5.96	1395	3.62	5.04	1734	3.36	5.75-30
46	Frick "C" 15-28	28.26	906	6.21	28.34	898	2.39	1199	29.72	917	5.71	14.61	935	7.15	2372	2.41	4.46	3264	2.24	4.75-32
49	Wallis 15-25	25.19	918	7.74	25.51	928	1.23	1224	27.57	907	6.88	14.98	1073	6.70	2362	2.55	3.54	2782	2.50	4.25-32
50	Floor City 18-35	35.23	805	7.68	35.05	802	1.07	920	35.46	807	7.58	18.91	857	8.42	3784	1.81	4.00	4116	1.71	12.75-30

*In engine only. The reports give kind of oil and amount used in transmission.

The pressure is never great enough to pack the soil no matter how soft it may be."

The belt pulley speed is given as 900 r.p.m. This should be changed to 950 r.p.m. to conform to specifications certified.

Carbureter is described as being the Bennett. This should be changed to Stromberg to conform to specifications certified. The tractor equipped with Bennett carbureter was given a brake test and developed only about 26 b.hp.

Test No. 23—Titan 10-20. In the advertising literature submitted with the application for test of this tractor we find some statements and claims which cannot be directly compared with the results of this test. It is our opinion that none of these statements or claims are unreasonable or excessive except the following:

"Chains are the best known final drive for a farm tractor." (We do not approve this statement for the reason that proof is lacking.)

"It is the most practical cooling system known."

"The throttle governor . . . keeps the speed constant at all loads." (The governor gave exceptionally close regulation of speed in this test; but the speed varied some with load changes.)

"The facts are that the Titan 10-20 . . . will pull as many plows as any other tractor of equal rating . . ." (We do not approve this statement for the reason that authentic information is not available at the present time on the capacity of some of the tractors included in this comparison.)

Test No. 29—La Crosse Model G 12-24. In the advertising literature submitted with the application for test of this tractor we find some statements and claims which cannot be directly compared with the results of this test. It is our opinion that none of these statements or claims are unreasonable or excessive except the following:

"Perfect fuel combustion."

"La Crosse tractors hold the low fuel consumption record."

"Line drive unequalled either by other tractors or horses."

"Horizontal twin-cylinder motor has been thoroughly proved to be the most efficient design for burning kerosene."

"More economical in operation and upkeep than any other tractor."

We do not approve the above statements and comparisons because they cannot be directly compared with results of this test, and proof is lacking.

Test No. 30—Aultman-Taylor 30-60. In the advertising literature submitted with the application for test of this tractor we find some statements and claims which cannot be directly compared with the results of this test. It is our opinion that none of these statements or claims are unreasonable or excessive except the following:

"We guarantee this tractor to move more cubic feet of earth in a given length of time with less fuel and less maintenance cost, using the same tools, working under the same conditions . . . than any other make of tractor regardless of its size or rating."

"...it is still first in the large tractor field, because no other tractor can produce a similar record for faithful, economical performance over a period of ten or more years."

"In fact they (the 22-45 and 30-60) have established records for power and economy that have never even been closely approached by any other tractor."

"We can safely say that they are the best designed and best built tractor motors used on any heavy duty tractor."

(We do not approve the comparisons with other tractors quoted above for the reason that proof is lacking.)

Test No. 31—Aultman-Taylor 15-30. In the advertising literature submitted with the application for test of this tractor we find some statements and claims which cannot be directly compared with the results of this test. It is our opinion that none of these statements or claims are unreasonable or excessive except the following:

"And it gets every ounce of power out of the fuel that there is in it."

"In plowing, for example, this 15-30 does double the work of the two-tractor in the same time, with less than one-half the operating cost, and in doing the work it travels only one-half the distance so naturally last once again as long."

"... enables the 15-30 to work on plowed ground without packing the soil."

"This size develops 30 hp. at the belt with several horsepower reserve." (We do not approve this statement for the reason that it is indefinite and therefore likely to be misleading.)

Test No. 32—Aultman-Taylor 22-45. In the advertising literature submitted with the application for test of this tractor we find some statements and claims which cannot be directly compared with the results of this test. It is our opinion that none of these statements or claims are unreasonable or excessive except the following:

"In fact they (the 22-45 and 30-60) have established records for power and economy that have never even been closely approached by any other tractor."

"We can safely say that our tractors are free from any transmission trouble."

"We can safely say that they are the best designed and best built tractor motors built on any heavy duty tractor."

(We do not approve the comparisons with the other tractors quoted above for the reason that proof is lacking.)

Test No. 35—Coleman Model B 16-30. In the advertising literature submitted with the application for test of this tractor we find the following statement regarding horsepower capacity. "An excess of engine power." We do not approve this statement for the reason that it is indefinite and therefore likely to be misleading. We also find in this advertising literature some statements and claims which cannot be directly compared with the results of this test. It is our opinion that none of these statements or claims are unreasonable or excessive except the following:

"Motor—All bearings flooded with oil under pressure. No piping to clog."

"Carburetor—Bennett special tractor." (This should be changed to Stromberg to conform to specifications certified to us.)

"In transmitting engine motion into steady, useful *pulling* leverage against the ground through the rear axle and drive wheels no tractor excels the Coleman Worm Drive. The jack screw power principle as adapted for tractor use in the Coleman worm and worm gear makes possible a greater actual utilization of power than in any other tractor."

Test No. 37—Parrett Model "K" 15-30. Advertising literature submitted with the application and specifications for test of this tractor, contains some claims and statements which cannot be directly compared with the results of this test. It is our opinion that these are not excessive or unreasonable except the following:

"Direct drive on every speed, delivers all the power of a wonderful motor."

"Great reserve power."

"Great economy in either kerosene or gasoline."

"Direct drive on every speed, delivers all the power in plowing or belt work."

"Exceptional large radiator capacity and placing of same affords unusual cooling ability."

"The most powerful three plow tractor in the world."

We do not approve the above exceptions because proof is lacking and they are indefinite.

Test No. 39—Avery Six Cylinder Model "C." In the advertising literature submitted with the application for test of this tractor we find the following statement: "This machine is recommended to burn gasoline, but may burn kerosene with entire satisfaction . . ." This is not interpreted by us to be a claim that this is a kerosene tractor and therefore it was not operated on kerosene in this test. We find in this advertising literature some statements and claims which cannot be directly compared with the results of this test. It is our opinion that none of these statements or claims are unreasonable or excessive.

Test No. 40—Avery Six Cylinder Motor Cultivator. In the advertising literature submitted with the application for test of this tractor we find the following statement: "Fuel: Gasoline. Many customers report using kerosene, however, with satisfactory results." We do not interpret this statement as being a claim that this is a kerosene tractor and therefore kerosene was not used in this test.

In this advertising literature we find some statements and claims which cannot be directly compared with the results of this test.

It is our opinion that none of these statements or claims are unreasonable or excessive except the following:

"The Avery motor cultivator is the only real successful cultivator on the market to-day, and it leads the field in power, durability, simplicity, etc., over any other cultivator built."

"The Avery motor cultivator is adapted to more kinds of farm work than any other machine . . ."

We do not approve the comparisons with other tractors quoted above for the reason that proof is lacking.

Test No. 41—Avery 12-20. In the advertising literature submitted with the application for test of this tractor we find some statements and claims which cannot be directly compared with the results of this test. It is our opinion that none of these statements or claims are unreasonable or excessive except the following:

"Avery tractors have . . . motors . . . with . . . patented gasifiers that turn kerosene or distillate into gas and burn it all."

" . . . Avery . . . is the . . . most 'direct drive' transmission system built."

"Avery . . . is the . . . most efficient belt and drawbar transmission system built."

" . . . a larger percentage of the power developed by the motor in Avery tractor is delivered to the belt wheel and to the drawbar than in any other tractor built."

" . . . Avery opposed motors are superior to any tractor motor built."

"The opposed type of motor . . . is much better adapted for use in tractor work."

"The fuel system used on the Avery tractors from the 8-16 hp. to the 40-80 hp. size burns kerosene, distillate or any other low grade fuel more successfully than it has ever been done before."

" . . . Avery tractors are the simplest tractors built."

"Averys are the best all-around drawbar and belt tractors built."

We do not approve the comparisons with other tractors quoted above for the reason that proof is lacking.

Test No. 42—Avery 14-28. Remarks same as for Test No. 41.

Test No. 43—Avery 25-50. Remarks same as for Test No. 41.

Test No. 44—Avery 40-80. Remarks same as for Test No. 41.

Test No. 45—Cletrac W 12-20. In the advertising literature submitted with the application for test of this tractor, we find some claims and statements which cannot be directly compared with the results of this test. It is our opinion that these are not excessive or unreasonable except the following:

"It is easy to line up and easy to keep lined up on belt work."

"20 horsepower at belt without strain in any part."

"It burns kerosene or distillate or gasoline perfectly, and uses less than two gallons of fuel per working hour."

"The Cletrac plows an acre an hour—10 acres a day—and does it on not more than two gallons of fuel per acre."

"For example in operating the larger types of ensilage cutters the Cletrac might use say 1½ gallons of kerosene an hour while on lighter work it would use less than a gallon."

Test No. 46—Frick "C" 15-28. In the advertising literature submitted with specifications and application for test of this tractor, we find some statements and claims which cannot be directly compared with the results of this test. It is our opinion that these are not excessive or unreasonable except the following:

"Right belt power for farm machines."

"No unnecessary side draft—a saving of fuel and power."

"Fuel operating cost as low as the lowest."

We do not approve of the above statements because proof is lacking.

Test No. 49—Wallis 15-25. All during this test, the motor while running on kerosene seemed to load up on fuel and slow down, miss fire once and then run smoothly again for a while. On gasoline it worked smoothly. In the advertising literature we find some claims and statements which cannot be directly compared with the results of this test. It is our opinion that these are not unreasonable or excessive except the following:

"Delivers 74 per cent of its motor power to drawbar."

"Wallis is unexcelled for hauling."

"Among the few good tractors the Wallis stands out head and shoulders above all the rest as 'America's Foremost Tractor'."

"It was and is years in advance of all others."

"Wallis develops wonderful power and burns any fuel."

We do not approve of the above statements, because proof is lacking.

Test No. 50—Flour City 18-35. In the advertising literature submitted with the application for test of this tractor, we find some statements and claims which cannot be directly compared with the results of this test. It is our opinion that none of these statements and claims are unreasonable or excessive except the following:

Page 11—"The gears are made from drop forgings of high carbon steel accurately machined and hardened, enclosed and running in oil, and they are unequaled for substantiality and long life."

Page 12—"There is an entire absence of vibration in Flour City tractors."

Substitute Metals in Automobile Construction

Notes from an official report made by the manager of a German vehicle park during the war show how the shortage of copper and aluminum was met by the use of iron and steel in various forms wherever possible.

By Benno R. Dierfeld

THE German Transport Corps during the war had plenty of opportunity for gathering information regarding substitutes for metals and other materials employed in automobile manufacture and some of the experiences then had may prove of value to automobile designers. The following translation of an official report by the manager of a large motor car park, should therefore interest readers of AUTOMOTIVE INDUSTRIES.

Substitutes for Aluminum.—Crankcases of cast iron are considerably heavier, but are just as durable as those of aluminum. More care is required, however, in making them oil tight. Crankcases of sheet steel are only slightly heavier than aluminum crankcases, and present no other disadvantages.

Fans with sheet steel blades, if well riveted, are in no way inferior to aluminum fans. Fans with sheet zinc blades are too heavy. The blades break owing to cold shortness and are apt to badly damage the radiator.

Inlet manifolds, water jacket cover plates and valve spring cover plates of malleable cast iron are inferior to aluminum only in that they are heavier.

Clutch cones of pressed steel are not heavier, and are more durable than aluminum cones, because the latter will easily break if not handled properly.

Transmission casings of cast steel are considerably heavier, but are stronger and more rigid than aluminum.

Headlamp reflectors of zinc are considerably heavier and more breakable than aluminum reflectors, and they are often broken by road shocks. Breakage very seldom occurs with aluminum reflectors.

Substitutes for Babbitt Metal.—The greater the component of zinc or lead, the shorter the life of the bearings.

Ball and roller bearings for the main and crankpin journals are very serviceable if of sufficient dimensions. The roller bearings mounted in the connecting rods are usually of too small size.

Substitutes for Copper.—Cooling water connections of malleable cast iron or seamless steel tubing did not show any disadvantages. Steel tubing is quite serviceable for the connections of the lubricating system. Fuel supply pipes of steel will break in two months if not firmly fastened to the frame, and if the fuel used contains water or alcohol, they rust easily. Steel tubing for conveying acetylene gas to the headlights will rust within a very short time. Steel-asbestos gaskets must be handled more carefully in dismantling than copper-asbestos gaskets, as they do not conform as readily to the shape of the flanges. Electric cables of steel wire are quite durable when carefully mounted.

Substitutes for Bronze, Brass, Etc.—Bearing shells for the main or crankpin bearings, made of cast iron, if well tinned, give sufficient adherence to the babbitt metal.

Piston pin bearings of cast iron are quite serviceable; if made of steel there is a tendency to scoring, unless they are carefully hardened. Camshaft bearings of cast iron are easily hammered out in small engines. Timing gears of cast iron, if sufficiently liberally dimensioned, will last for a long time. Circulation pump housings of cast iron will rust only slightly as long as the car is in regular service. Universal joint bushings of steel, if well hardened, are the equal of bronze bushings. These steel bushings must have flanges with substantial fillets, otherwise cracks and ruptures will occur. The manufacture of such steel bushings requires considerably better equipment than the manufacture of bronze bushings. Universal joint sliding blocks of steel, if very carefully hardened, are quite reliable; ball bearings are not as serviceable as these blocks, as they cannot be sufficiently lubricated. Cast iron steering gear nuts and sectors wear rapidly.

Substitutes for Brass.—Radiators of tin plate rust through in a short time, becoming sieve-like and draining dry in about three weeks. Water drain cocks of iron easily rust and stick; compression cocks of iron (in the ordinary or standard form) will burn and stick and are easily wrenched off when great pressure is applied to open them. The newer construction in the form of conical valves can be easily opened, but unfortunately they often open of themselves. Compression cocks of brass with iron taps are useless, because on becoming heated the tap will stick in the brass; on the other hand, iron cocks with brass taps have proved very serviceable. Fuel valves made of iron are not serviceable, as they do not make a tight fit. Valve caps of cast iron do not burn or stick in the cylinder threads, and can be easily unscrewed.

Disk clutches composed of steel disks only serve very well if carefully lubricated. Often such clutches are superior to the kind in which bronze and steel disks alternate, being more durable. Ball bearing mountings of malleable cast iron in the transmission case did not show any disadvantages. Gear shifter rod guides of malleable cast iron with bushings of brass serve as well as all brass guides. Rear spring saddles can be made without bushings if lubrication is properly provided for. If bushings are used, they can be made of thin sheet brass. Acetylene generators of sheet iron rust through in a short time, so that repairs are not worth-while. Some good rust-preventing method, such as galvanizing of the whole generator, must be applied under all conditions.

Substitute for Leather.—Clutch lining of woven camel's hair is considered better than second grade leather lining. Linings of course easily scale off.

Substitute for Rubber.—Horn bulbs of sheet metal, if not used for a considerable period, are difficult to operate, owing to the formation of rust.

Two Types of Airships Used By French Government

The latest dirigible has volume of 339,000 cu. ft. and uses two 250 hp. Renault engines mounted in streamline nacelles, and driving four-bladed tractor propellers of 10.2 ft. dia. Earlier machine has volume of 97,000 cu. ft. and uses two 80 hp. engines driving two-bladed pusher propellers.

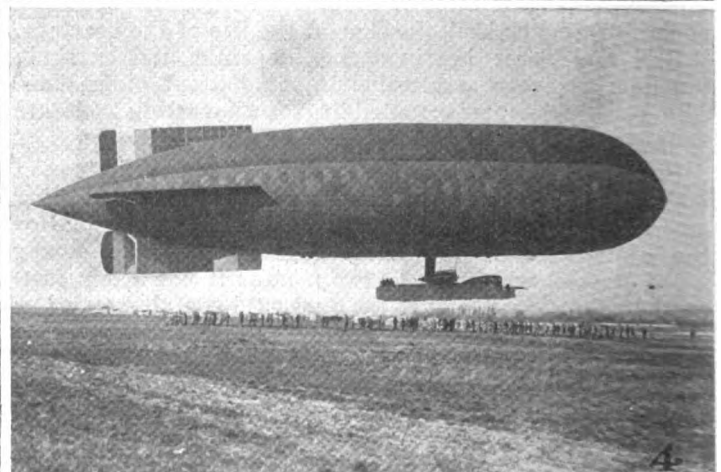
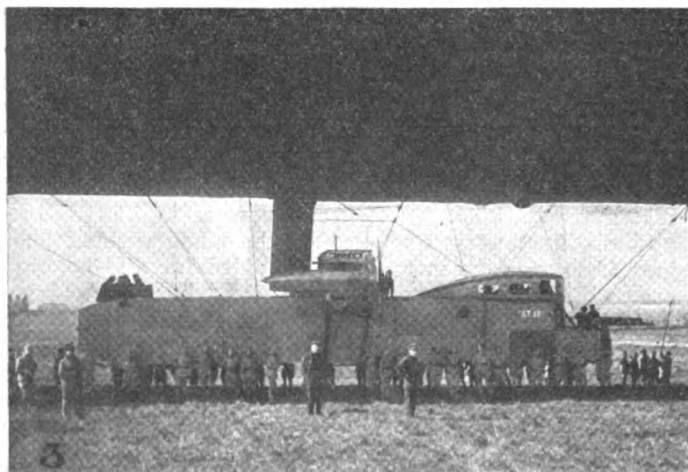
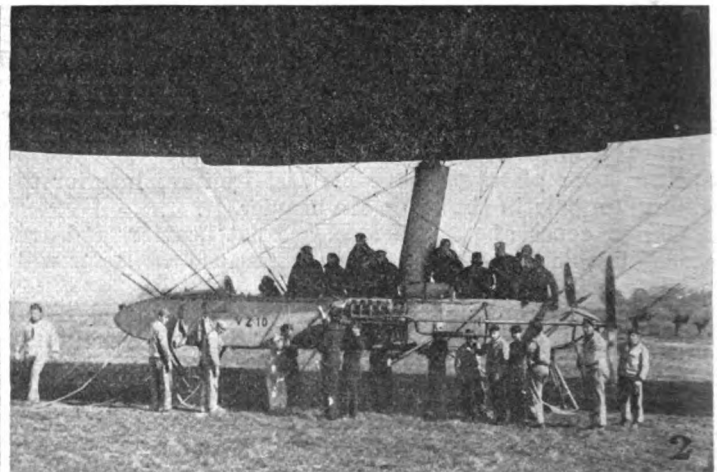
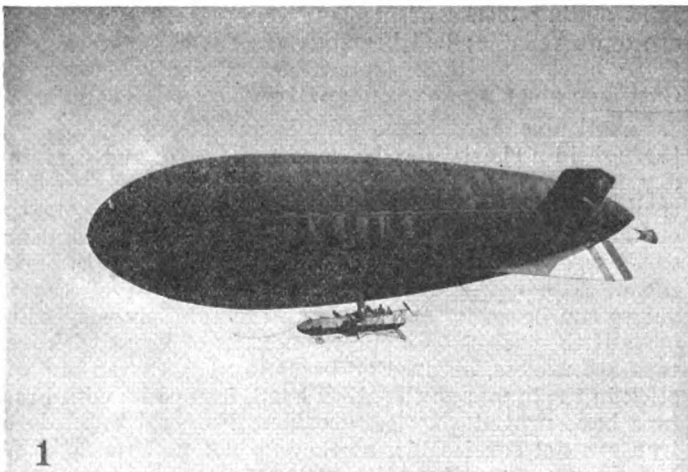
By John Jay Ide

THE latest airship delivered to the French Government was built as part of a contract for six airships—AT-18 to AT-23 inclusive—of which the first two units have been completed, and the orders for the remainder cancelled. The AT-18 soon after delivery was destroyed by colliding with a mountain while en route to the South of France. Her sister ship, the AT-19, is now stationed at the aero station center at St. Cyr, and has just been accepted by the French Navy.

The envelope, of two-ply fabric, is of the familiar

Astra-Torres trilobe pattern of rather poor streamline form. Its capacity is 339,000 cu. ft. The fin area is exceptionally great. There is only one rudder, of the balanced type, which forms a continuation of the lower vertical fin. The car, made up of wooden framing with steel wiring and covered with canvas, is rectangular in section with little or no attempt to reduce head resistance.

In the bow of the car is a platform for a 75 mm. gun, reached by a trapdoor in the floor of the navigating room,



(1) French naval airship VZ-10 from below. (2) Car of VZ-10, showing long transmission shaft between 80-hp. Renault engine and propeller. (3) Astro Torres AT-18. Side view of car, showing 75-mm. gun, navigating room and one of the 270-hp. Renault engines. (4) Astro Torres AT-18. Side view showing trilobe envelope, large fin area and single balanced rudder

which is just aft of and slightly above the gun platform. This navigating room is enclosed and lighted by a number of windows.

Aft of the navigating room on the starboard side of the lower level is the wireless telegraph room, with a S. F. R. 500-watt set weighing 176 lb., while on the port side is the corridor with a door giving access to the car.

Amidships is the engineer's station with the five gasoline tanks containing 488 gal. and a 6 hp. Charron blower engine for the two ballonets. A ladder ascends to the platform from which the two 250-hp. Renault engines mounted outboard in streamline nacelles can be reached. The radiators mounted in the nose of the nacelles have proved insufficient and additional small radiators have now been installed above the engines. The four-bladed tractor propellers are 10.2 ft. in diameter.

Aft of the engineer's station are the racks for the four 330-lb. bombs and in the stern of the car is a machine gun mount.

The specifications of the AT-19 are as follows:

Volume	339,000 cu. ft.
Volume of ballonets.....	141,000 cu. ft.
Length	262.4 ft.
Maximum width of envelope.....	54.1 ft.
Width over fins.....	59.0 ft.
Total height.....	71.2 ft.
Length of car.....	53.1 ft.
Width of car.....	5.6 ft.
Height of car.....	6.6 ft.
Area of horizontal fins.....	968 sq. ft.
Area of vertical fins.....	645 sq. ft.
Area of elevators.....	323 sq. ft.
Area of rudder.....	204 sq. ft.
Useful load:	
Crew (7 people).....	1232 lbs.
Equipment	528 lbs.
Fuel and oil.....	2750 lbs.
Wireless equipment.....	176 lbs.
Armament	1760 lbs.
Ballast	2534 lbs.
Total	8980 lbs.

Speed (maximum), 50 miles per hour; cruising range, 10 hours; engines, two Renault, each developing 250 hp. at 1300 r.p.m.

Among the most popular airships used by the French Navy are the Vedette Zodiac types designed during the war, primarily for submarine scouting and built by the Zodiac Co. Although of very moderate size (97,000 cu. ft.), they can carry a considerable load and are fast for their power. They are also very maneuverable.

A typical example of the VZ class is the VZ-10, which was recently examined by the writer at St. Cyr, France. This ship is powered by two Renault air-cooled engines developing 80 hp. each at 1700 r.p.m. As shown in the photographs, these engines are placed outboard amidships and the drive to the two-bladed propellers at the stern is by means of long shafts inclined outward and equipped with universal joints. This method of drive has proved perfectly satisfactory with these engines. In one of the VZ airships, however, the Renaults were replaced by 150 hp. Hispano-Suiza aviation engines in an effort to improve the performance. With this installation spark plug trouble occurred after a few hours running causing vibration and breaking of the shafts.

The car carries the altitude pilot in the nose with a rudder bar for emergency use. Aft of the altitude pilot's station are two seats side by side, the directional pilot using that on the port side. The engineer is amidships and in the stern are a Lewis machine gun and two bombs. A small 400-watt C. G. R. wireless set is carried.

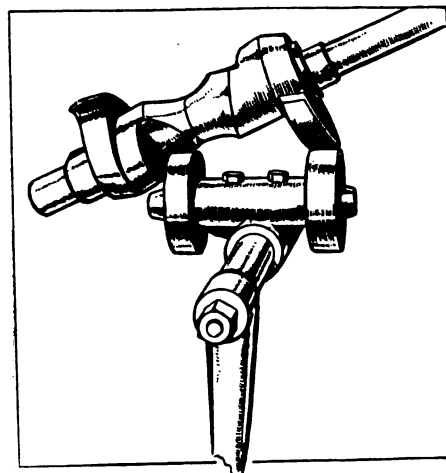
At the stern of the envelope, which is of good streamline form, are two small horizontal fins and elevators and one vertical triangular fin with a balanced rudder. The specifications of the VZ-10 are as follows:

Volume	97,000 cu. ft.
Length	156 ft.
Diameter	35.6 ft.
Width over fins.....	40.4 ft.
Total height.....	56.1 ft.
Crew (4 people).....	704 lbs.
Armament	220 lbs.
Ballast	605 lbs.
Speed	48 miles per hr.
Cruising range.....	6 hr.

A Steering Gear for Trucks

WE recently described the Marles steering gear, which comprises a double volute cam acting on a double armed lever carrying ball bearing rollers at the ends of its arms. The original design allowed for rather less than a single turn of the steering wheel to move the road wheels through their total range of deflection. This is not enough for heavy trucks, and Mr. Marles has therefore designed the gear shown herewith, which requires two complete revolutions of the steering wheel to move the road wheels from hard over one way to hard over the other way. This design also differs from the one previously described in that the angular deflection of the road wheels varies directly with the angular motion of the steering wheel.

F. FORREST, president of the Midland Branch of the Institute of Electrical Engineers, thinks that it is as nearly impossible to train men for research work as it is to train poets. It is necessary, he says, to first discover men with an aptitude for research work and then pay them.



The Marles cam steering gear. Two complete revolutions of steering wheel gives maximum angular motion to road wheels

Refinement, Style and Comfort Aim in New Body Designs

Straight lines characterize several of the prominent new models, while special effort to provide every comfort for the rider seems to have been made in most cases. One model shows extreme "cubist" lines, while the "Grecian edge" makes its appearance on another car.

By George J. Mercer

A STUDY of the new body designs indicates that manufacturers have endeavored to meet every demand that the buyer might make in regard to refinement, style and comfort. While the exteriors make the first appeal to the prospective owner, special attention has also been given to interior appearance and comfort, since interior values play a large part in influencing the selection of the more discriminating buyers.

The accompanying illustrations present the main features of the new designs being marketed and indicate in a general way some of the trend of body design. Since the main features of design are more or less familiar, attention can be directed chiefly to the more detailed phases of seating sizes, appointments, and trimmings.

The view of the new Buick seven-passenger touring model shows quite clearly the interior construction and equipment. The customary straight pleat is used on back and cushions, as well as on the sides of the rear section. On the sides of the front seats and the doors, however, the trim is plain. A robe rail and foot rest are provided, while the top presents exceptionally good lines. It is equipped with a detachable gypsy quarter curtain.

In the interior view of the four-passenger Liberty coupe the visor bracket and the comfortable seating arrangement are noticeable. Pleats are used on the cushions and on the seat backs as well. Trimming on the doors is plain. The door windows are equipped with regulators. A single dome light is placed in the center of the roof. This body is designed to seat four persons, the fourth seat being of the type which folds up. It is located at the right of the driver and faces forward. Another interior view of the Liberty coupe shows the large package compartment at the rear of the driving seat.

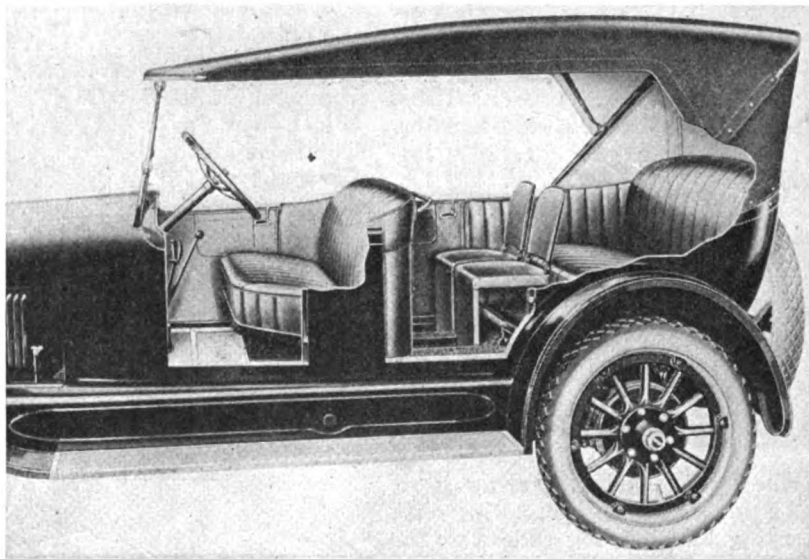
Some of the chief dimensions of this Liberty model are as follows: Tires, 33 x 4½; standard chassis; size of

rear cushion, 20 in. deep, 36 in. wide, 9 in. thick; distance from top of cushion at front to floor, 13 in.; distance from top of cushion at front to roof, 37½ in.; size of door, 26½ in. wide over outside; rear window, 33 x 15 in.

The two exterior views of the Mercer coupe and touring limousine are shown herewith. Both these models are low in appearance yet commodious. The coupe seats four and the touring limousine six persons. These bodies are constructed with aluminum panels and have leather roofs. The touring limousine has a glass partition at the rear of the driver's seat that allows the body to be readily di-

vided into two compartments. A telephone is provided for communication in such cases. Among the important dimensions are the following: Wheelbase, 135 in.; rear seat cushions from floor to top, 13 in.; distance from top of rear seat cushions to roof, 36 in.; rear seat of touring limousine, 14 in. wide.

The cut of the Premier touring model shows a Victoria body with a molded top edge, called by the manufacturers the Grecian edge. It gives a more harmonious effect than does the bevel edge but



Interior view of Buick seven-passenger touring model

permits the same low side appearance, and has the additional advantage of allowing the sides to be sufficiently high for comfort.

A rear view of the Roamer coupe is also reproduced. This model shows the bevel edge carried out on the roof and rear corner, and illustrates what is perhaps the most extreme cubist model being marketed.

The National touring model, illustrated herewith, shows a straight line through to the radiator. This is a semi-sport type without runningboards and presents a very low hung appearance.

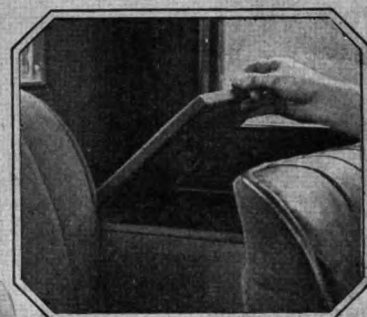
The seven-passenger touring body of the new Sheridan car is also illustrated. This body has straight lines and a modified second cowl. It is equipped with disk wheels, a ventilator in the shroud, and dash lamps. The mud guards have molded edges.



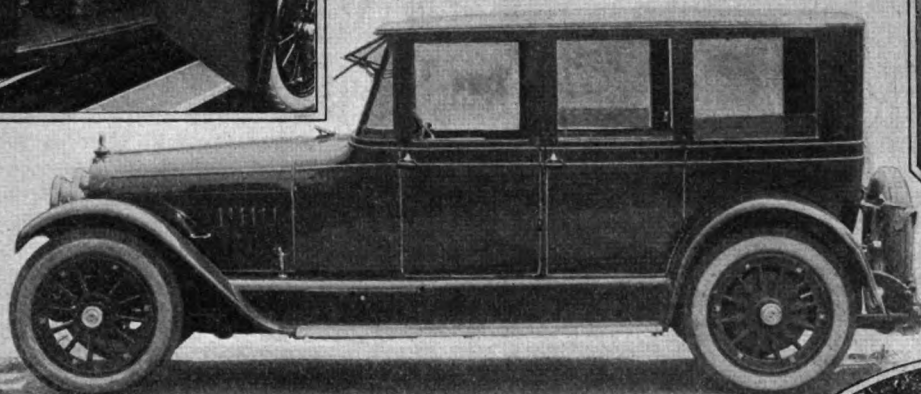
National touring model



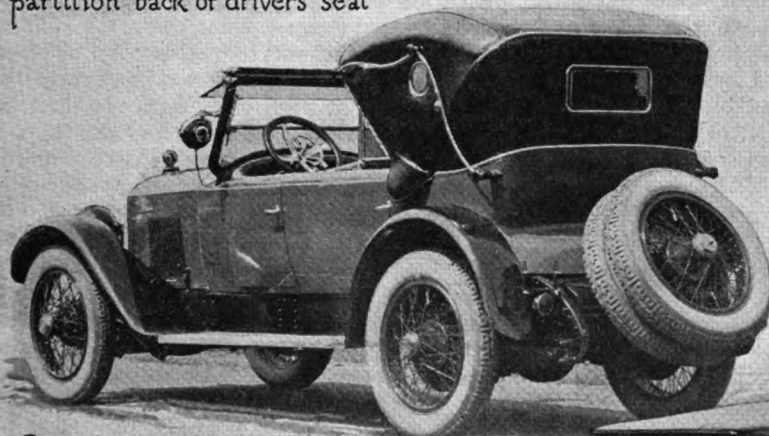
Interior view, Liberty coupe, showing comfortable seating arrangement



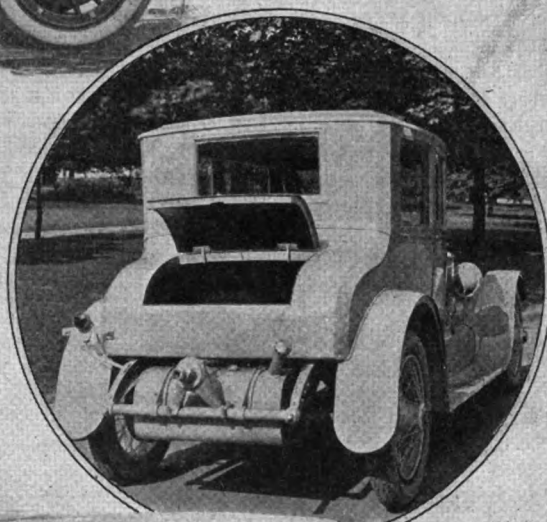
Large package compartment provided in Liberty coupe



Mercer touring limousine, seats six and has moveable glass partition back of driver's seat

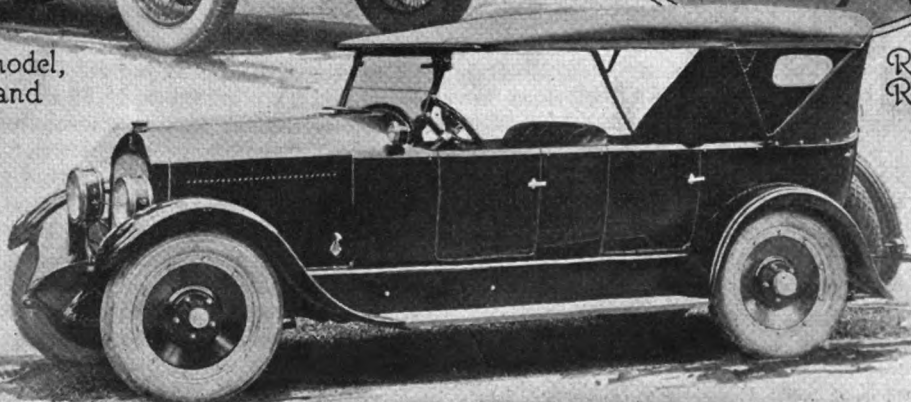


Premier touring model, with Victoria top and "Trecian edge"



Rear view of Roamer coupe

Seven passenger touring model of new Sheridan car



An Engine With Clearance Volume and Valve Timing Both Variable

Experimental engine has hydraulic device for raising and lowering crankshaft, thereby varying the compression. Tests indicate considerable saving in fuel under normal operating conditions, but some mechanical complications are involved as in other similar efforts toward same end.

ENGINEERS who have made a study of the theory and practical operation of the constant volume engine in general use on modern vehicles are well aware of the fact that, in common with other types of throttling engines, the economy is much less under throttled conditions (part load) than at full load. Since automobile engines operate under part load a large proportion of the time, many attempts to improve their inherent economy at part load have been made, but largely because of the mechanical complication involved, these attempts have not resulted in commercial application. In spite of this fact the rising price of fuel has encouraged further experimentation in the belief that the saving in fuel possible will justify increased first cost and, if necessary, somewhat increased cost of upkeep.

Charles A. Salisbury of Hudson, Iowa, has recently conducted experiments with an engine in which the throttle is maintained, but provision is made to vary the clearance volume in such manner as to maintain or increase compression pressures under part loads. As will be seen from the appended transverse sectional view of the engine, the crankshaft is carried in what would normally be the lower half of the crankcase, the latter being hinged at one side, and at the other connected to a linkage which enables the crankshaft and its carrying members to be raised and lowered, thus varying the compression space above the piston. The linkage for raising and lowering the crankshaft is controlled by an hydraulic piston operated by the flow of oil from the pump, driven from the crankshaft. The controls for this pump are interconnected with the

throttle in such manner that the crankshaft is raised at part load when the throttle is nearest its closed position, and lowered when the throttle opens. At low loads the clearance volume can be decreased to one-fourth the maximum volume allowed under full load. When applied to a car, the variation in crankshaft position makes necessary a universal joint between engine and clutch.

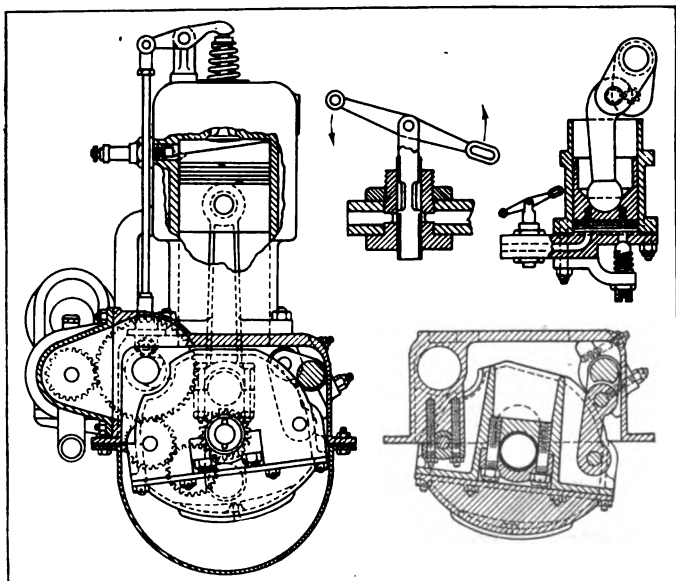
Means are provided for varying the timing of the inlet valves, the cams for the latter sliding lengthwise on the camshaft. The cams are so graduated on the closing face as to vary the closing point of the valves. The latter are held open during the entire suction stroke as in an ordinary engine, but are closed at varying points during the compression stroke to so limit the charge as to give the desired compression pressure. This method of control has the advantage that the compression is automatically increased with increased engine speed.

The inventor states that tests of the experimental engine have demonstrated the following points: 1. That the crankshaft, supported in the manner indicated, is as rigidly secured as in an ordinary engine. 2. That the secondary, unbalanced forces do not affect the engine differently at any speed than the regular type. 3. That the system of induction developed when using partial charges does not affect operation of engine when using regular manifold and reasonably dry gas. 4. That the expansion can be carried practically to atmospheric pressure up to one-third load. 5. That much higher compression pressure can be carried with advantage at high engine speeds than at low speeds, without pre-ignition or affecting smoothness of operation. 6. That the engine is as sensitive to control and as responsive to same as the regular engine, and that operation is as easy as with the ordinary type of engine. 7. That the average gain in mileage amounted to 40 per cent.

One disadvantage of the design is the fact that the area of the combustion chamber wall is not materially altered with decrease in volume of the clearance space.

The compression pressures used are said to have varied from 83 lb. at cranking speed to 120 lb. at 2400 r.p.m. with one-fourth normal volume of compression space, while with approximately full volume they varied from 90 lb. at cranking speed to 58 lb. at 2000 r.p.m., this variation being due in part to the change in valve timing. Under normal conditions of operation on the road, it was found possible to maintain a setting such as to give a clearance volume of one-fourth that used in the normal engine, but this did not hold true under conditions of rapid acceleration, heavy going, or climbing of steep grades.

The inventor of the engine points out the advantage of varying the timing of the inlet valves with the speed of the engine. He states that at lower engine speed there is a direct volumetrical loss of 11 per cent in an engine with valves closing 45 deg. late, as compared to 10 deg. late



Variable clearance engine

in the experimental engine in question. It was found that the largest charge retained at high speed in the experimental engine was with the inlet valve closing at about 85 deg. late. It is thus argued that the size of an engine for given power can be made much less, if provision for changing the valve timing is made.

The experimental engine is said to weigh about 15 per cent more than the regular engine, but this difference in weight can be cut to 10 per cent by improvements in design.

The designer of the engine in question states that at engine speeds equivalent to a road speed of 25 m.p.h., the

efficiency of the engine will remain constant regardless of load, while in the case of the ordinary engine the thermal efficiency decreases rapidly with decrease in load. In tests of a car equipped with the experimental engine, the gain in fuel economy is said to have been 21 per cent at 8 m.p.h. At 22 m.p.h. the increase is 36 per cent. These tests, it is said, were very carefully made with the same carbureter and setting, and the same position of ignition and control.

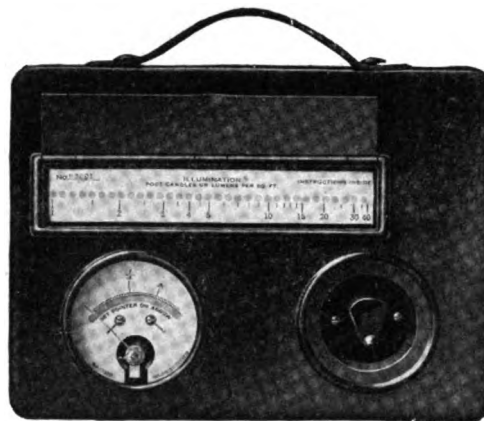
In one series of tests it was found that the fuel consumption steadily decreased with decrease in size of the clearance space down to one-fourth normal.

Direct-Reading Foot-Candle Meter

A DIRECT-READING foot-candle meter has been developed for readily determining the intensity of illumination at any particular point in a store, shop, living-room, etc. It is made in portable form and can be set on a bench, counter, etc. The principle of the device is as follows: If a white cardboard containing a small hole over which has been placed a piece of white tissue paper is held between the eye and a source of light, the tissue paper spot will appear brighter than the white cardboard. On the other hand, if the spot is viewed with the eye on the same side as the source of light, it will appear darker than the white cardboard. This, of course, is due to the fact that the white tissue paper is translucent and reflects only a small portion of the light falling upon it, whereas the white cardboard reflects a large proportion. If the illumination on both sides of the cardboard is the same, the tissue paper spot and the white cardboard appear to be of the same brightness.

The above principle is applied to the foot-candle meter in the following way: Instead of cardboard and tissue paper, the screen consists of a piece of clear glass on which are two thicknesses of paper, the one which contains the round holes being fairly opaque, and the other highly translucent. This screen forms one side of the light box which is so constructed that the screen is illuminated from within (by an electric bulb mounted at one end) to a much higher intensity at the right than at the left. The exposed side of the screen is very nearly uniformly lighted, and the round spots appear brighter than the surrounding screen at the right end and darker at the left. It is evident that at the point where the spots change from brighter than their background to darker, the illumination on both sides of the screen is, as with the cardboard illustration, approximately the same. When the instrument has once been calibrated, the illumination intensity on the screen may be read at a glance.

It is obviously important that after the foot-candle



A portable foot-candle meter

meter has been calibrated, the light supplied to the screen from within must be constant for all readings or the indications will be in error. A rheostat, or adjustable resistance, is connected in series with the lamp and the battery. This permits the voltage applied to the lamp to be maintained at a constant value as the battery gradually depreciates. The voltmeter indicates the voltage applied to the lamp.

The best luminous intensity in industrial plants varies with the character of the work done. In rough box manufacture an intensity of 4 foot candles has been found sufficient, whereas where very accurate cabinet work has to be done, 7-8 foot candles is desirable.

ACCORDING to the Department of Statistics of India, 1041 motor cars were imported into British India during September, 1920, and of them no fewer than 723 cars were consigned from the United States, only 247 being received from the United Kingdom.

Preserving Polish of Metals During Annealing

IN a process, recently invented in Germany, for protecting polished metals which have to undergo annealing, from the tarnishing which occurs under ordinary treatment, a solution of boric oxide is used. The solution is only applied as a very thin film over the articles to be annealed, but it is claimed that it completely excludes atmospheric oxygen. The film melts at a temperature varying between 550 and 650 deg. Cent., according to its composition, and acts as a protection so long as it remains solid. Steel, for example, remains bright when heated to the melting point of the composition, and no discoloration takes place when the steel is tempered. It is stated to be

still more effective in the molten or semi-molten condition, as it then forms a perfectly gas-tight cover round the article, even when heated to the highest temperature used in practice. The coating is perfectly fireproof, does not evaporate, and dissolves any oxidized matter on the surface of the heated metal. The coating can be applied either as a powder, sprinkled or dusted over the surface of the objects to be annealed, or as a liquid. It is soluble in water and methylated spirit, and the work to be annealed is simply dipped in the solution and allowed to dry. The coating peels off on cooling, or can be dissolved in warm water.

Machine for Milling Off Crankshaft and Camshaft Ends

Has capacity of 250 pieces per hour. Work is carried in pockets on revolving drum. One head is stationary and the other adjustable to accommodate work of varying length. Skilled operator not required.

IN machining shafts and similar parts which have to be turned on centers, the first operation usually consists in facing off both ends, and in many cases the shaft has to be brought to exact length at the same time. A machine for doing this work on the continuous operation principle is being manufactured by the Newton Machine Tool Co. and is illustrated in Fig. 1. In Fig. 2 are shown shafts $1\frac{3}{8}$ in. in diameter which are being faced to length, with a production of 250 pieces per hour. For this operation the intermittent feed and rapid traverse mechanism is used. That is to say, when the pocket containing the pieces has revolved past the milling cutters, the feed automatically trips and engages the rapid traverse, which advances the work holding drums at a ratio of 10 to 1, and just before the next pocket containing the shafts is reached, the rapid traverse is tripped, reengaging the feed motion.

The loading of the drums is performed on what is the rear side of the machine in photograph. Unclamping and unloading of the drum for this operation are performed automatically. It will be observed that clamping is by a

toggle lever which, as the drum rotates, is released by coming in contact with the two studs which are bolted to the housing. This allows the shafts to roll on the pans which, it will be observed, have an inclined surface, from which they are discharged into a tote box, or in some cases onto a roller conveyor. In this particular application there are ten stations or pockets on the drum, each holding three of the shafts in question.

Fig. 3 shows the machine as set up for machining both ends of a six-throw crankshaft. The jig locates the crankshaft by the plungers in the center, and they are placed alternately, which brings them so close together that the jump mechanism as described above is not required on the operation. The production on these crankshafts is 90 per hour.

Fig. 4 shows the method of machining both ends of camshafts. In this jig the camshaft is located by a universal chuck in the center, working from the center bearing. Again these pieces are placed so close together that the jump feed is not employed.

All of these operations are performed on the machine shown in Fig. 1. One head is mounted stationary at the

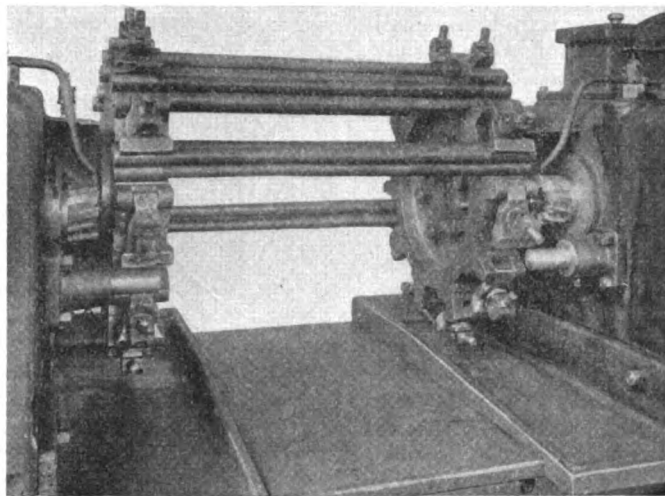


Fig. 2—Fixtures for holding shafts for facing off ends, with automatic unloading device

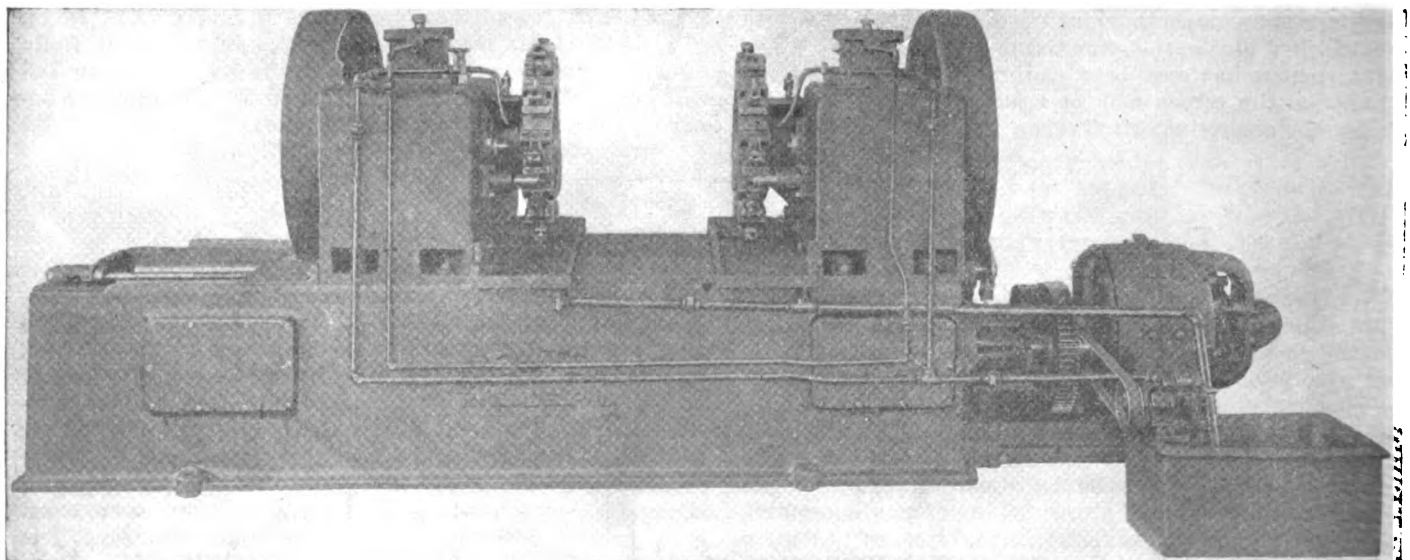


Fig. 1—Newton continuous milling machine for facing ends of shafts, etc.

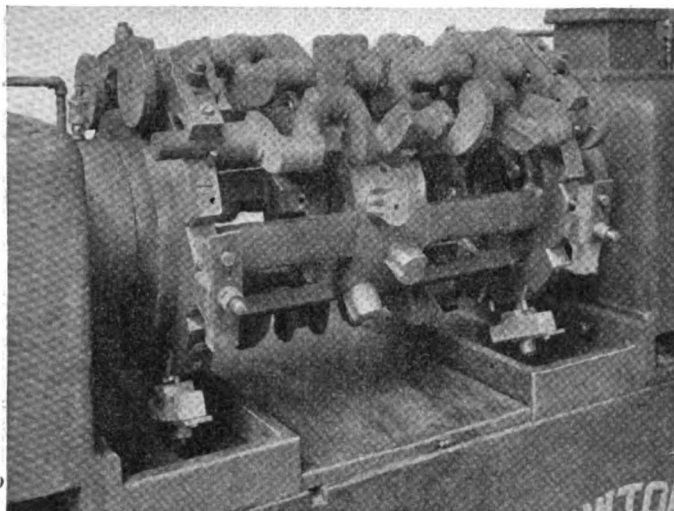


Fig. 3—Fixture for holding crankshaft

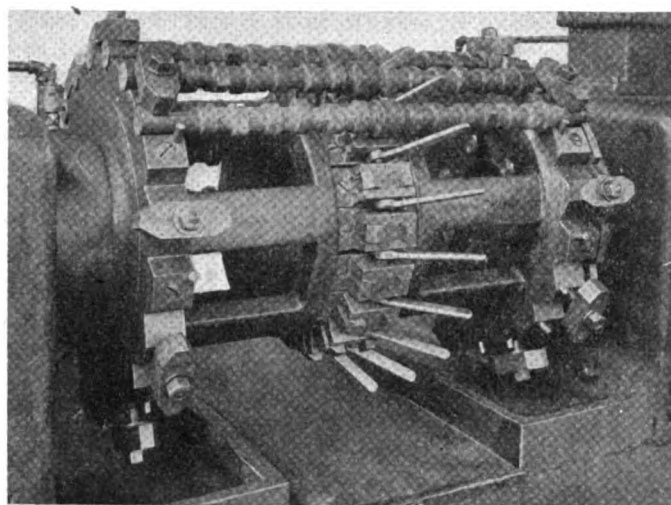


Fig. 4—Fixtures for camshaft

end of the base, while the other head is adjustable so as to take care of work of varying lengths. Each cutter spindle is individually adjustable for depth of cut; roughing and finishing cuts are taken for accurate work.

All bearings are oiled by a cascade system of lubrication. The machine does not require a skilled operator,

as any workman can be quickly taught the simple operation of inserting and removing the pieces from the jig. The cutter spindles are driven by worms and worm wheels. The drum spindles are revolved by gears, both of which are driven from a common pinion shaft so that there is no possibility of their being out of register.

A Spiral Tooth Milling Cutter

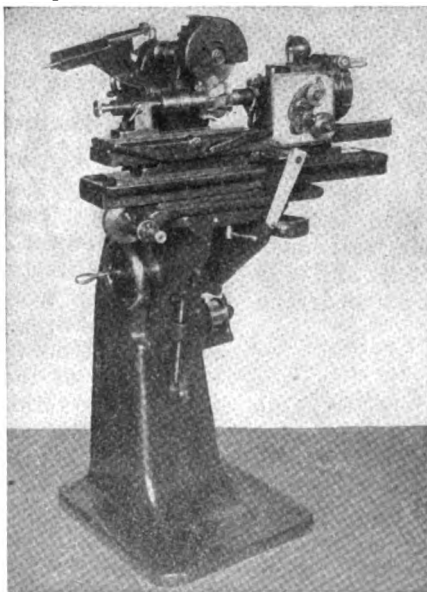
THE advantages of "spirally" cut teeth have long been recognized by users of plain milling cutters. As contrasted to the chopping action of the straight tooth cutter, which strikes the work a distinct blow with each successive tooth, the progressive shearing cut of the cutter with "spiral" teeth insures a smooth, even surface and results in a decided increase in output due to the greater feeds and higher speeds that can be used. For this reason, in plain milling, cutters with "spiral" teeth are selected whenever high production and smooth cutting are looked for.

Mechanical difficulties connected with the manufacture and resharpening have heretofore prevented the use of "spiral" tooth form milling cutters. Pratt & Whitney now claim to have overcome these difficulties in their Curvex cutters. These are strictly production tools, combining the advantages of the older types of formed cutters with the smoothness of cutting, more rapid feed and greater speed, characteristic of "spiral" teeth.

We illustrate herewith a cutter grinder specially designed for grinding Curvex cutters. The machine is equipped with a conical grinding wheel which presents a single line of contact to the work. The wheel, therefore, is able to accurately follow the helical path of the tooth and to grind the cutting edge to the form required.

The machine is designed to impart a combined traverse and rotary movement to the cutter. The table on which the cutter is mounted can be swiveled horizontally about an axis which intersects the axis of the spindle and

grinding wheel. When grinding Curvex cutters, this table is swiveled at an angle to correspond to the helix angle of the cutter teeth. It is then reciprocated in the usual way by means of a handle operating a rack and pinion. At the same time an oscillating movement is imparted to cutter through a set of change gears selected to conform to the lead of the cutter.



Grinder designed for grinding Curvex cutters

IN a paper recently presented to the American Iron and Steel Institute, the author, D. M. Buck, metallurgical engineer, American Sheet and Tinplate Company, states that there is an overwhelming mass of evidence to prove that by allowing with normal open-hearth or Bessemer steel a small copper content—0.15 to 0.25 per cent—the corrosion produced by air and moisture is greatly reduced. The melting point of copper is about 700 deg. Fahr. lower than the average tapping temperature, it diffuses readily, and once diffused does not segregate. The manufacture of copper steel has heretofore been largely confined to sheet metal, and the product has been greatly improved. A conservative estimate indicates that the life of sheet metal is at least doubled by this treatment. The author advocates the use

of copper in all iron and steel products called upon to resist the attack of air and moisture.

THE Federal Trade Commission recently announced that forty-five export associations are operating under the Webb-Pomerene Law. These are combinations of firms for selling purposes.

The Amortization of War Plant Equipment

Here is one feature of the business income tax law that appears to have been overlooked in many instances by manufacturers who have not been able to write off all of their war losses. It is not generally known that the opportunity remains open for adjustment of plant valuation.

By Arnold F. VanPelt*

HOW many industrial executives have given serious thought to the provisions of the Amortization Clause, Section 214(a)9, of the Revenue Act of 1918? And how many of those who have given the matter consideration honestly understand the rights and privileges which this unusual provision of the Law confers upon them? It is a fact that the deductions permitted under the Amortization Section of the Revenue Act greatly exceed in value the deductions permitted under any other clause of the Law.

Congress undoubtedly made this provision so as to provide adequate relief from impossible taxation to the army of manufacturers whose wartime expansion was dictated by a sense of patriotism rather than by the hope of long continued business prosperity. During 1917 and 1918 the principal aim of American industry was to win the war in the shortest time possible. Regular production was largely discontinued, new plants were erected, old plants were converted and special machinery was purchased at fabulous prices. Automobile plants were transformed overnight into shell factories, shipyards appeared as if by magic, machine shops and foundries undertook production along new and untried lines, food manufactories enlarged their facilities to meet the ever-increasing demands of the war—the whole fabric of American industry, suddenly called upon to meet the urgent needs of the war machine, responded patriotically, met the demand placed upon it, and was a major factor in bringing the war to such a speedy and fortunate conclusion.

Sudden Change

Armistice Day found our great industrial machine working uphill at top speed. Thirty days later contracts had been cancelled and new and efficient plants were standing idle, their utility value suddenly nullified by the suspension of hostilities. Some of these plants are still idle—others have resumed operations on a reduced basis—many have been converted into peacetime industrial units—but in all cases their original economic value has been much decreased. It is true that a considerable part of the shrinkage in plant values has been liquidated by the Federal Government through its various War Claims Bureaus. The amount of damages paid to business organizations, under contract cancellation agreements, by the War and Navy Departments and by the Shipping Board, while of material assistance to industry throughout the country, does not end the

story. From the standpoint of the manufacturer, consideration must be given to the Tax Law. In this connection it is well to call attention to the fact that Regulation 45, promulgated by the Commissioner of Internal Revenue, clearly specifies that "any allowance made to a taxpayer by a contracting Department of the Government or by any other contractor, for amortization or fall in the value of property, * * * shall be included in gross income."

If Congress had made no provision in the Tax Law for writing off, as a deduction from gross income, the shrinkage in value of wartime industrial plants, many war industries would have been forced to repay to the Government, in the form of Income and Profits Taxes, from 30 per cent to 80 per cent of the amounts received as compensation under contract cancellation agreements with the various contracting Departments of the Government. Congress, however, realizing the unusual industrial and financial conditions brought about by the war, provided Section 214(a)9, as a relief clause in the Revenue Act of 1918.

Technical Features of the Clause

It is the purpose of this article to call attention to this section of the Revenue Act and to present, insofar as is possible in a general survey of this kind, an exposition of the technical features of the clause. In the minds of the manufacturers of the country the matter is still shrouded in mystery. Heretofore writers on Federal taxation have generally avoided the subject, probably because the matter was new and untried and the technical phases of the question little understood. And yet there is no other relief provision of the tax law of more vital interest to industry, nor involving so many millions of dollars.

Before proceeding with the discussion of the application of Section 214(a)9 to the tax problem of wartime industry it is well to outline the distinction which the Internal Revenue Bureau makes between the terms "Depreciation" and "Amortization." Section 214(a)8 allows, as "Depreciation" a reasonable deduction from gross income to cover shrinkage in value of plant facilities resulting from wear and tear or from obsolescence due to the normal progress of business. The Bureau of Internal Revenue apparently applies the Depreciation Section literally. Unless an asset of the taxpayer loses a portion of its useful life from actual wear and tear or from obsolescence due to the normal progress of business, no deduction can be claimed under the heading "Depreciation." While it is rather common practice to refer to wartime industrial facilities

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as becoming "obsolete" the Regulations of the Commissioner of Internal Revenue draw a line of distinction between those facilities which have become wholly or partly valueless through invention or change in style, and those wartime facilities which have lost their utility or economic value through the sudden cancellation of war business. Therefore, all extraordinary deductions resulting from the loss of economic or utility value in wartime facilities must be made under the relief section, that is, Section 214(a)9, Amortization.

The amortization deduction applies to a somewhat more limited field than does the depreciation and obsolescence deduction, but in industrial cases the amounts involved are much greater under the Amortization Section than under the Depreciation and Obsolescence Section. A separate deduction for depreciation or obsolescence cannot be claimed against facilities which are to be amortized. In this connection it is well to bear in mind that, although depreciation and obsolescence cannot be claimed against facilities which are to be amortized, nevertheless, in determining the proper allowance for amortization both depreciation and obsolescence may be included as factors.

Study of the Law

A careful perusal of Section 214(a)9 will disclose the fact that the law is broad enough to enable every business organization, whose wartime plant, by reason of the cessation of hostilities has lost all or a part of its utility or economic value, to file a claim for, and to be permitted to deduct from gross income, a reasonable amount for amortization or shrinkage in value of such facilities.

The Amortization Section provides that in computing net income there shall be allowed as a deduction from gross income a reasonable amount for the amortization of buildings, machinery, equipment, vessels, or other facilities, constructed, erected, installed or acquired on or after April 6, 1917, provided such facilities were for use in the production of articles or in the transportation of men or articles contributing to the prosecution of the war.

These provisions are generous in their scope. There are but three clauses in the section which limit the facilities which may be amortized:

1. The facilities to be amortized must have been constructed, erected, installed or acquired on or after April 6, 1917.
2. They must have been used in the production of articles or in the transportation of articles or men contributing to the prosecution of the war.
3. The deduction claimed must be reasonable.

April 6, 1917, is the date the Federal Government declared war and the insertion of this date in the Amortization Clause makes it clear that Congress did not wish to extend the privileges of amortization to those manufacturers, who prior to April 6, 1917, had taken the speculative risks involved in the erection of plants for the production of war materials for foreign governments. Most of the business men who "went into war work" after April 6, 1917, did so largely through patriotism, although it cannot be denied that in many cases the possibility of profit was a strong factor. On the other hand, those manufacturers who engaged in the production of munitions for foreign governments before our entry into the war did so from a purely commercial standpoint and are certainly not entitled to the same relief as are those manufacturers who, on or after April 6, 1917, constructed new plants and converted old plants in order to assist in meeting the unusual demands placed upon the United States and its Allies by the war.

The Income Tax Unit at Washington has apparently been liberal in its interpretation of the clause restricting amortization to those facilities used in the production of articles, or in the transportation of articles or men, contributing to the prosecution of the war. In view of the fact that the production and transportation of non-essentials were prohibited during the critical period from April 6, 1917, to November 11, 1918, it would seem that this restrictive clause has no practical effect and that any facility constructed, erected, installed or acquired during this period is capable of being amortized under Section 214(a)9, provided, of course, a real loss in economic value has been sustained.

Articles 184 and 185 of Regulations 45, Final Edition, contain the meat of the departmental regulations covering amortization. Article 184 prescribes the basis upon which amortization claims should be filed and Article 185 enters into a discussion of methods of spreading the amortization deduction over the taxable years of 1918 and 1919. Studying each of these articles at this late day, twenty-two months after the close of the war, it is at once apparent that the methods provided therein are inadequate and in some ways impossible of execution. This is not intended as a criticism. It must be remembered that Regulations 45, containing Articles 184 and 185, was published in the early months of 1919, and at that time it was the general belief that normal post-war conditions were to be looked for in a few months after the close of the war. Business prosperity and the era of high prices, the peak of which we have probably just passed, were not then anticipated. The amortization deduction is influenced entirely by economic conditions and in the early months of 1919 economic conditions for the balance of the year could not well be foretold.

One Amendment

In only one essential particular have Articles 184 and 185 been amended since the publication of Regulations 45, Final Edition. This amendment (Treasury Decision 2859) materially altered Article 184 and had an indirect and disconcerting effect on the method of spreading the amortization as outlined in Sub-division "C" of Article 185. Treasury Decision No. 2859 will be fully discussed elsewhere in this writing.

Article 184 classifies all facilities subject to amortization into three groups:

1. Facilities permanently discarded at the date of the return (that is, March 15, 1919).
2. Facilities to be permanently discarded prior to the last installment payment of the tax covered by the 1918 return (that is, December 15, 1919).
3. All other facilities (facilities having a certain useful life after the cessation of wartime production).

With regard to facilities falling in classes No. 1 and No. 2 above, the amount of amortization allowable is the difference between the undepreciated or unextinguished cost of the facilities and the scrap value thereof at the time such facilities are discarded. All wartime facilities which the taxpayer retained to use in his post-war business operations fall within Class No. 3. With regard to this latter class of property, the allowable amortization as originally provided for in Sub-division No. 3 of Article 184 was the difference between the undepreciated or unextinguished cost of such facilities and the "reproduction cost" thereof as at April, 1919. Obviously this portion of Article 184 had a tendency to limit the more liberal wording of the Law. April, 1919, was an arbitrary date fixed by the Bureau of Internal Revenue with the apparent belief that economic conditions would again be normal at that time. The fallacy of this belief is too

well known to merit discussion. The use of the phrase "reproduction cost" in establishing a basis for the determination of the amount of amortization on facilities falling within Class No. 3 was certainly anything but fair to taxpayers. With reproduction cost as at April, 1919, as the basis of value no deduction whatever could be claimed by the owner of Class No. 3 facilities to compensate for the extraordinary cost of construction of plant and installation of equipment during the war period for the reason that reproduction cost of plant facilities was, if anything higher during April, 1919, than during the actual war months.

On June 10, 1919, in recognition of the unfairness of Sub-division No. 3 of Article 184 the Treasury Department issued Treasury Decision No. 2859 reading as follows:

"Paragraph No. 3 of Article 184, Regulations 45, Final Edition, is amended to read as follows:

"In the case of other property the basis for the amortization calculation shall be estimated value of the property to the taxpayer in terms of its actual use of employment in his going business, such value in no case to be less than the sale or salvage value of the property, provided, however, that in no case shall the preliminary estimate (for purposes of returns to be made in 1919) of the amount of such amortization exceed 25 per cent of the cost of the property. In the final determination the amount of the amortization allowance will be ascertained upon the basis of stable post-war conditions under regulations to be promulgated when these conditions become apparent."

"Actual Use"

This amendment substituted a basis of "actual use or employment in his (the taxpayer's) going business" for "reproduction cost as at April, 1919." Undoubtedly this new basis is more in conformity with the spirit of the law than was the old basis of "reproduction cost" and yet under a narrow interpretation of the wording used a large number of taxpayers might be denied adequate relief. "Actual use" in the taxpayer's going business has been interpreted to mean the extent to which such facilities are utilized in actual operations. Under this construction a large body of manufacturers would be unable to obtain any relief whatever, unless the facilities involved were discarded. A still larger body of taxpayers would be denied a part of the relief to which they are entitled.

In order to clearly focus the unfortunate conditions which might arise out of a narrow interpretation of the wording "actual use or employment in his going business," let us take for example a manufacturer who, at the outbreak of the war, constructed a new plant for the production of high grade motors of a special type to meet the requirements of the Army. Under the spur of the War Department the plant was erected in the shortest time possible, overtime labor being used to a considerable extent. To expedite building operations much of the material was brought in by express. Skilled labor, taking advantage of the unprecedented demand for its services, insisted upon hitherto unheard of wages. Machinery and equipment were built under abnormal conditions and at outlandish prices. Motors for the Army had to be produced regardless of cost. The plant finally starts producing and works at top speed for a short period. The armistice is signed, orders are cancelled, and the plant is shut down.

The War Department pays to the manufacturer a lump sum to compensate for the loss sustained and in recognition of the excessive cost of construction of buildings

and installation of equipment. The manufacturer who has a modern, well-equipped plant standing idle, finds that his plant, with slight alteration, can be used for the production of automobiles and that the demand for automobiles is sufficiently large to enable him to utilize his plant to capacity. An investigation of the cost of production, however, demonstrates to him that he cannot carry his plant at its cost value (less normal depreciation from wear and tear) and at the same time earn a profit on the production and sale of automobiles. He finds that his capital investment is out of line with the capital investments of other automobile manufacturers whose plants were constructed under better conditions.

Taxed on Allowance

He then reasons that he can apply the lump sum payment received from the War Department against his plant values, thus reducing his capital investment to a normal basis. He is advised, however, that he must report the payment received from the War Department as income under the Revenue Act of 1918 and pay to the Treasury Department as Income and Profits Tax thereon a large portion of each dollar received from the War Department as the result of the cancellation of war contracts. Acting under proper counsel, he seeks relief under the terms of the Amortization Clause of the Revenue Act of 1918, Section 214(a)9. A claim for amortization under Treasury Decision No. 2859 is prepared and filed with his tax return. In his claim he states that his plant can be operated to full capacity in the production of automobiles, provided a reasonable allowance is made for amortization to compensate for the loss in economic value of his plant and facilities.

Under a narrow interpretation of the words "actual use or employment in his going business" the Income Tax Unit might ignore the fact that the inflated plant values arising out of wartime construction rendered competitive production impossible, and would decide that, inasmuch as the facilities involved are to be used to capacity under the proposed production plan of the manufacturer, no allowance for amortization may be made. Under such a ruling the manufacturer would be forced to abandon his automobile project and to discard his plant. Upon taking such action he would file a new claim for amortization in a sum equal to the difference between the undepreciated cost of his plant and the scrap value thereof. If the facilities were actually discarded the revised claim would be allowed by the Bureau of Internal Revenue subject only to adjustments arising out of the determination of scrap value. Who would be the loser? The taxpayer would reduce his Federal taxes, but would lose the profits which would have accrued to him from the production and sale of automobiles. The Federal Government would lose a large amount of revenue, for it is reasonable to assume that the amount amortization allowed upon the abandonment of the plant would greatly exceed the amount which would have satisfied the taxpayer had he been allowed his original claim under Treasury Decision No. 2859. And in addition to its current loss of revenue the Government would, in effect, have destroyed a legitimate industry and throttled a future possibly large source of revenue.

Such would be the unfortunate condition brought about by a narrow interpretation of the wording of Treasury Decision No. 2859. All parties interested, the taxpayer, the Government, and the public, through the Government, would suffer an unnecessary loss.

An equitable valuation of Class No. 3 property should have as its basis the economic worth of such property to the taxpayer, either for use in his going business or for sale. The allowance on Class No. 3 property should be

the difference between the cost of the facilities (less depreciation on account of wear and tear), and their economic value in the going business of the taxpayer, or their scrap value (or sales value) whichever is the greater.

It is only fair to say, however, that the officials of the Income Tax Unit apparently have not overlooked the fact that many wartime plants are now carried at such high values, due to war cost of construction, as to effectively prohibit their use in competitive peacetime production unless relief is extended, even though the facilities are in other respects easily adaptable to normal uses. This condition is a highly important factor in the determination of the amortization allowance to be made to any industrial organization coming within its scope, and no taxpayer is justified in assuming that the Income Tax Unit is not prepared to give it thorough consideration.

Only to One Return

That portion of Treasury Decision No. 2859 which provides that the preliminary estimate of amortization on Class No. 3 property must not exceed 25 per cent of the cost of such property applies only to the original return filed in 1919. Many taxpayers have gathered the impression that this clause definitely and permanently limits the amortization deduction against Class No. 3 property to 25 per cent of its cost. The claim for amortization on Class No. 3 facilities can be for any amount which, in the taxpayer's judgment, is reasonable and which can be substantiated by reliable data. The deduction for amortization in the return for 1918 (filed in 1919) was temporarily limited to 25 per cent of the cost of Class No. 3 property. This clause was undoubtedly inserted to prevent unscrupulous taxpayers from claiming unreasonable deductions against Class No. 3 facilities with the full knowledge that such deductions were not warranted, in order to save themselves, for the time being, the payment of their full share of Income and Profits Tax.

It should be understood that the original allowance for amortization as claimed by the taxpayer, or as allowed by the Income Tax Unit, is not necessarily final.

The law provides that "at any time within three years after the present war, the Commissioner may, and at the request of the taxpayer shall, re-examine the return and if he then finds, as a result of an appraisal or from other evidence, that the deduction originally allowed was incorrect, the taxes imposed by this Title and by Title III for the year or years affected shall be redetermined."

This provision gives the taxpayer full assurance that his claim will ultimately be settled under conditions which from all indications should be normal. Also it should be remembered that technically we are still at war and that the three year period will not commence to run until peace has been officially declared.

Article 185 of Regulations 45 prescribes the method of spreading the amortization allowance over the taxable periods involved. Primarily, the amortization allowance is to be spread over certain specified periods in proportion to the net income (computed without the benefit of the amortization allowance) from January 1, 1918, to the termination of what may be referred to as the "Amortization Period." The length, and therefore the termination, of the amortization period is ascertained separately for each class of facilities to be amortized, so that:—

- (a) If the claim is based on Sub-division (1) of Article 184 the termination of the amortization

period is the date upon which the property WAS permanently discarded.

- (b) If the claim is based on Sub-division (2) of Article 184 the termination of the amortization period is the date upon which the property WILL BE permanently discarded.
- (c) If the claim is based on Sub-division (3) of Article 184, the termination of the amortization period is April, 1919.

Reading the sub-divisions of Article 185 in connection with the kindred sub-divisions of Article 184, it appears that the amortization period on Class No. 1 property must terminate not later than the day upon which the 1918 tax return is filed (in most cases March 15, 1919), and the amortization period on Class No. 2 property must terminate not later than the day upon which the last installment of the 1918 Income and Profits Tax is due (in most cases December 15, 1919). It would seem from the wording of the regulations that no property may be classified as "discarded" unless the act of discarding took place on or before Dec. 15, 1919, and that facilities discarded after Dec. 15, 1919, must be allocated to Class No. 3 property. Attention is called, however, to the fact, that both Article 184 and Article 185 open with the words "for the purpose of making returns in 1919." It is therefore apparent that the ruling regarding the classification of discarded property is effective only with respect to returns filed in 1919.

If the taxpayer desires to discard his wartime facilities any time after Dec. 15, 1919, and within the three year limitation, he has a legal right to claim a reasonable allowance for amortization thereon, under the classification of discarded property.

Articles 184 and 185 could be made more explicit, and therefore much more effective, by classifying in one group all discarded war facilities, and all such facilities to be discarded within the three year limit prescribed by law, and by stipulating that when the claim is based on discarded property the termination of the amortization period becomes the date, or rather the average date, reported as the time when such facilities were discarded. Regardless of the limitation at present surrounding the termination of the amortization period it will, in most cases, be necessary to establish an average date of discard, and this date can be arrived at only by arbitration between the representatives of the taxpayer and the officials of the Income Tax Unit.

The question has been asked many times as to just what disposition must be made of wartime facilities in order that they may properly be said to be "permanently discarded." The Bureau of Internal Revenue has never officially defined the term "permanently discarded," but it seems to be the consensus of opinion that amortizable property need not actually be destroyed or dismantled in order to come within the meaning of the wording used in Article 184.

If a plant, or a building, or even a piece of machinery, is not now in use, and if, in the judgment of the taxpayer, the facility will not again be utilized it may be termed "permanently discarded," even though it is not ripped out and reduced to scrap. It may be cheaper for the taxpayer to allow his discarded property to stand in its original location than to undertake reducing it to scrap. It would seem to be immaterial whether the property is left standing or whether it is dismantled. But is the property again to be used? The answer to this question is the deciding factor in allocating amortizable property to the sub-divisions of Article 184.

Article 185 specifies that the close of the Class No. 3 amortization period shall be April, 1919. There appears to be no special reason for the establishment of April, 1919, as an arbitrary date for the termination of the amortization period on Class No. 3 property. The choice of the date undoubtedly has its inception in sub-division No. 3 of article 184, which establishes April, 1919, as the time for the determination of the reproduction cost of war-time facilities. However, as has already been stated, sub-division No. 3 of Article 184 has been amended by Treasury Decision No. 2859 and, under this amendment, April, 1919, is no longer a factor in determining the allowance for amortization on Class No. 3 property. Just why Sub-division "C" of Article 185 was not amended, at the time Treasury Decision No. 2859 was issued, so as to provide a new basis for the determination of the amortization period on Class No. 3 property is unknown. It is believed that the mention of April, 1919, in Sub-division "C" of Article 185 was simply overlooked at that time.

The amortization deduction is an abnormal deduction arising out of unusual conditions surrounding the construction, erection, installation or acquisition of wartime facilities. It is only fair to allow the deduction to be spread, on a basis of net income, over the entire period during which such facilities were operated as war production units, with the understanding that no deduction may be made for amortization prior to Jan. 1, 1918.

This principle was recognized in establishing the amortization period covering discarded facilities. It will be recalled that the amortization deduction is to be spread, in the case of discarded facilities, from Jan. 1, 1918, to the date of discard. In other words, the deduction on discarded property is to be applied to the period during which such facilities were actually used in war-time production. The present ruling that the amortization allowance on Class No. 3 property must be spread between Jan. 1, 1918, and April, 1919, is not equitable. In its place should be substituted a ruling permitting the amortization period on Class No. 3 property to run from Jan. 1, 1918, to the date upon which the facilities ceased to operate for war-time production. This ruling would enable the taxpayer to apply his amortization allowance on Class No. 3 property against the revenue arising out of the use of the facilities to be amortized.

Taxpayers, in order to receive the full relief accorded to them by law, should keep adequate book records of all war-time facilities subject to amortization, for it is only through the maintenance of such records that the taxpayer can hope to receive proper consideration from the officials of the Income Tax Unit should economic conditions make it necessary to reopen the claim for amortization within the three year limit.

The law specifies that the deduction for amortization must be reasonable. It is, of course, impossible to give a general formula for determining whether or not a given claim is reasonable. Each individual case has its own peculiarities and must be decided strictly on its own merits. The Income Tax Unit employs a staff of appraisal engineers, as well as a staff of competent accountants, whose time is devoted entirely to the settlement of amortization claims. It is the duty of the engineers, working in conjunction with the accounting staff, to determine scrap value and economic value in use, and to arbitrate their findings with the representatives of the taxpayer so as to arrive at a mutually agreeable basis of settlement.

In establishing a reasonable allowance both the accountants and the engineers of the Income Tax Unit have many factors to consider. For instance, in studying economic value in use with reference to Class No. 3 facilities in a given case the Amortization Staff would consider, among others, the following factors:

Cost.

Depreciation and obsolescence.

Extraordinary and unusual cost items.

Scrap value.

Second-hand sales value.

Rental value.

Adequacy under post-war conditions.

Surplusage of facilities.

Units produced during the war period.

Units produced at the time of the investigation.

Possible units to be produced in the future.

War-time employment of skilled and unskilled labor.

Peace-time employment of skilled and unskilled labor.

Convertibility of facilities.

Cost of conversion.

Economic value under competitive conditions.

All of these factors cannot be applied to every case—neither can each factor be given the same relative weight in the settlement of every claim. Many cases will require consideration of factors not enumerated above. It is therefore apparent that the determination of what constitutes a reasonable deduction is largely a matter of judgment and that it can only be arrived at through discussion by and arbitration between representatives of the taxpayer and the officers of the Income Tax Unit.

The taxpayer cannot exercise too much care in the preparation of amortization claims. He cannot present too much detail, provided, of course, the matter is well indexed. The Amortization Staff of the Income Tax Unit has innumerable claims to settle and cannot devote too long a time to the settlement of each individual case. The taxpayer should not expect that a lump sum claimed for amortization, supplemented by little or no data, will be allowed by the officials at Washington. The regulations of the Commissioner place the responsibility for the compilation of amortization data strictly on the taxpayer. If the taxpayer submits a claim which is not adequately supported by facts the Amortization Staff will probably disallow the claim in its entirety and notify the taxpayer that the matter cannot be reopened until full details are supplied.

The fact that complete information must be furnished to the Commissioner should not deter any taxpayer from filing a claim for the full amount of amortization which he believes himself entitled to. No claim is either too large nor too small to receive the attention of the Income Tax Unit. A screw machine may be amortized just as a complete plant or a series of plants may be amortized. The Commissioner will entertain any reasonable claim provided it is properly presented.

AS a means of providing for the present shortage of skilled labor in France a law has been promulgated providing for the creation of technical classes for youths under the age of eighteen employed in factories. Employers themselves have the right to establish classes, but where this is not done the classes must be instituted by the Chambers of Commerce or by professional groups with funds provided partly by the State. There is a general feeling that the State should not be permitted to monopolize the instruction, and employers are therefore urged to provide the instruction themselves as part of the technical training of their workers.

Making a Going Vehicle Out of the Legislative Committee

A New Jersey committee was so successful, after stopping to reconcile and co-ordinate apparent differences, that it was named as a permanent organization to suggest, as well as influence, legislation.

By Clyde Jennings

THERE is some highly interesting and constructive information in the recent defeat of Senate Bill 331 in New Jersey for those of the industry who are interested in legislation. We do not know just exactly who is interested in influencing legislation, but we do know that practically everybody in the industry should be. There will be 42 legislatures in session early in 1921.

This number of legislatures means many new and some very wild bills to be met with cold facts, regardless of the situation that already is developing in the National Congress. It means busy times for the automotive patriots who will seek to properly direct legislation. We hope there will be many such.

In New Jersey, Senate Bill 331 was designed with the sole purpose of increasing automotive registration fees on an average for all classes of vehicles about 50 per cent. The drafting of this bill followed a request of the county highway organizations for help in the construction of roads. The bill appeared to be rather popular with the members of the Legislature and it was the feeling that, in keeping with general sentiment to tax automobiles and trucks more heavily, it would be passed.

A Legislative Committee representing the various automotive interests in the State was formed to oppose the bill. The members of this committee were asked to prepare their arguments and meet for a conference. This meeting turned out to be a rehearsal of what each member of the committee planned to say, and it was found that the representatives of the industry did not agree.

The ideas ranged from that of the engineering group, who would scientifically rate trucks according to their effect on roads, to that of the member with political experience who would fight the proposed increase by demanding a reduction of fees and then compromising.

So the Legislative Committee went into a conference and a general compromise was effected on how the bill was to be opposed. In the end, a member of the committee was selected to write a statement of sufficient length to present the agreed-upon view. Each member of the committee was assigned a topic concerning which he was to speak in elaboration. On this committee were engineers, manufacturers, dealers, truck users and car owners. So the discussion of the subject was well rounded out.

Then the committee adjourned to reconvene on the morning of the day when it was to meet the Senate Committee that was to hold the hearings on Senate Bill 331. In due time the members of the Legislative Committee again assembled in executive session and the principal speaker selected at the first meeting read his argument. The other members each said or read his piece. All were

criticized and each went into the hearing in the afternoon prepared to do his part. And right well each did it, and the Senate Committee then and there voted against the proposed bill.

This incident is cited here as a good method of preparing for such hearings and of doing effective work. Certainly there must be an agreement among the opponents of any measure. Confusion in any cause is equivalent to defeat. A confused defense is often worse than no defense at all. Legislators are only human, after all. If these men see that the industry, including the users of vehicles, cannot agree upon what is right and fair, they are likely to follow the line of least resistance and pass the bill, no matter what it may be.

The chief statement in the New Jersey case was prepared by Harry Meixell, Jr., of the National Automobile Chamber of Commerce, who fortunately, is a citizen of New Jersey and had done much work on the road system of that State. He was entirely familiar with the topic.

Meixell's treatment of the topic was quite rational. Instead of basing his argument on the subject of fees alone, he reviewed briefly the history of highway legislation in the State, showed how highways had always been considered as chiefly a local problem and brought out the point that increased use indicated chiefly that the highways were of more importance than formerly to the community.

He quoted figures to show the increasing fees paid by motor vehicles and that these fees had increased in keeping with the increased use of vehicles and the consequent increase in need of maintenance. He pointed out strongly that the rational use of such fees were to maintain, not build, highways. Also that the present demand for aid from the local highway units, such as counties, would require a much greater sum than could be raised by such fees, if a maintenance fund was to be maintained. He emphasized strongly that should the local units be granted such assistance, it would establish a precedent for them to return next year for even greater assistance.

This argument, of course, was based on the theory that the main traveled highways are a State problem, just as is admitted by all well regulated highway systems.

Following this successful work, the New Jersey Committee was made a permanent committee on legislation for that State, with the distinct understanding that none of the organizations represented on this committee would approve or oppose any legislation until it had been discussed by the entire committee. The committee has extended its work by suggesting some legislation and drafting bills. California has a similar legislative plan.

Industrial Community as Foundation for Sound Industrial Relationships

A new industrial community has been built up along with a new automobile plant at Marysville, Michigan. Provision was made for the human element as well as for the mechanical elements in production and community life. Is beginning of an experiment worth attention and study.

IT is the interdependence of the various units of modern industrial organization that renders so complex the problem of the human element in industry. It is that factor which makes it necessary to judge every social theory and industrial relations plan not only in the light of its philosophical justice but also as regards the possibility of adapting it to conditions already present—or, what amounts to a different thing—of adapting present conditions to it.

It is not possible to do in regard to labor problems as one executive some time ago desired. He wanted to "just 'feather our own nest' and let the fellow across the street do as he likes." If this were possible, it might be a very desirable situation. All the plants whose executives had good ideas as regards industrial relationships would have perfectly satisfactory conditions; all the others would have their troubles within the limits of their own factory. Everyone knows that this is not the case. Every manufacturer is definitely affected by the way in which other manufacturers handle their labor problem; particularly is this true in a large city. And unfortunately for those executives who know what effective personnel methods are and desire to carry them out, the influence of many of their fellow manufacturers is harmful rather than helpful.

Because of these conditions, some manufacturers have attempted to break away from harmful environment as much as possible with the idea of being able to work out an intelligent personnel policy without having to bear the burden of ill-practice across the street. This desire, strengthened by the presence of other advantages, has influenced some manufacturers to establish their plants in a small town or even to go out into the open and build a town where none existed before.

The progress of several such experiments has been discussed previously in *AUTOMOTIVE INDUSTRIES*, and in each case that progress tended to show favorable results. The fact is worthy of note that another automobile manufacturer, trained in a very practical way throughout his long experience, is following out this same plan. This particular experiment has scarcely started so that no evaluation can be put upon its effectiveness at present. The beginnings of the development and the ideals behind them, however, are of interest to those who may wish to follow the future course of the development.

A Good Foundation

The first feature of interest about the development of a manufacturing center at Marysville, Michigan, by C. H. Wills & Co. is that work was begun on providing suitable homes and living conditions for men at the same time adequate housing for machinery and factory equipment was put under construction.

The story is told that when the Erie Canal was built,

the man in charge of the construction work very carefully provided stables and fodder supply for the horses and mules which were necessary to the operations, but that no systematic provision for housing and feeding the workmen was made. The same practice is common even today, when chambers of commerce urge new industries to come to their city and start operations and trust to luck—which has been very bad of late—to obtain homes and suitable living environment for the men who must come to carry on the new manufacturing operations.

The builders of this new plant at Marysville, however, did an unusual thing; they thought out in advance the entire manufacturing problem, including that of the human element. C. Harold Wills, president of C. H. Wills & Co., feels very strongly that labor is never likely to be efficient unless it is contented, and that it is not likely to be contented unless it has a pleasant place in which to live and work. For this reason, the construction of houses and the development of a pleasant community has been completed in conjunction with the erection of the plant and equipment for the manufacture of the Wills-Saint Claire automobiles.

Community Development

The community development has been built up from a small village of about 150 people. It was necessary to clear some 4,200 acres, a part of which was wooded, and to lay out a town on entirely undeveloped land. Homes, school facilities, a recreation hall, and men's dormitories have been erected, so that every type of workman is provided for.

Each home site comprises a plot 40 feet by 120 feet, so that ample space is provided for a small garden or yard about each house. The houses differ from one another in construction, a variety of plans having been used in conformity with the best modern practice in community town building. The narrowest street is 60 feet wide and the widest 150 feet wide.

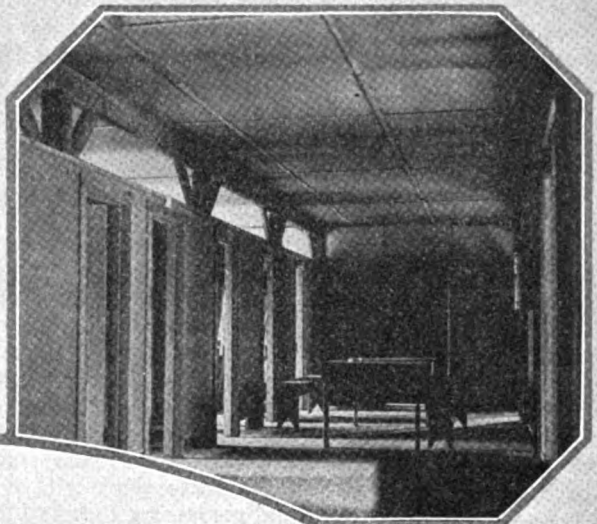
Modern sanitary conveniences are common to all the homes, while the town itself is equipped with excellent sewerage facilities, paved streets, sidewalks, etc. A central dining hall has been provided for the single workmen, so that their existence may be as comfortable and satisfactory as that of the married men.

The new town is already occupied by some 4,000 persons, and 200 children are attending school in the town school house. The factory is ready to start production on January 1st, and both manufacturing and human needs have been met.

To those who have lived in construction camps and in new factory towns where community facilities were allowed to take care of themselves, it is easy to understand the future advantages which should be gained from this correlation of plant erection and community building.



A closer view
of several
of the homes.



Interior of
one of the
dormitories
in which the
single men
are housed.



A view of
a part of the
home development.



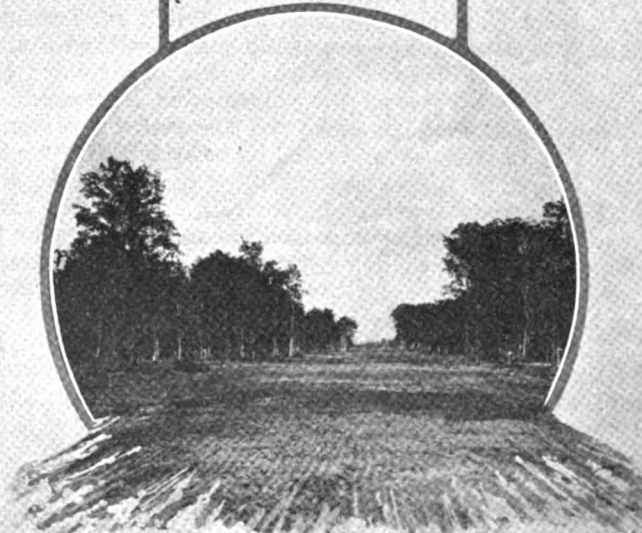
Recreation Hall, which was erected
in one day by the concentrated efforts
of the workmen at Marysville. ~ ~



One of the more
pretentious private homes.



Living room of one of the community houses.



Washington Boulevard, one of the
main streets, under construction. ~

Under the old conditions, manufacturing in the new plant usually started with workmen who were there simply for the high wages which they could obtain; they cared for nothing about the plant or the company except the money they drew each week. This was necessarily the case, because there was nothing but money to care about.

Not only was labor turnover high, but since no one was enjoying life an undercurrent of discontent throughout the plant was inevitable. Later perhaps conditions would improve, but it is obvious that good relationships between employer and employees had to be built up on a foundation of dissatisfaction and unrest. The factory was starting its existence and beginning to make its tradition in an unfortunate manner. And that tradition inevitably carried on, making it always difficult, even in the light of later improvements, to overcome that first spirit of discontent which began with the plant.

Under conditions such as have been provided at Marysville, with facilities such that the workman can start a decent and enjoyable individual life along with a new job in a new plant, a strong and promising foundation for the development of good industrial relationships has been laid. "Everybody is happy" to begin with; it is much easier for co-operation and mutual help to develop between employer and employee under such circumstances. Consequently, the effort of the Wills company is worth special attention. It indicates an excellent conception of what constitutes proper industrial relationships. A firm foundation has been laid.

But, it may be objected, few firms have the necessary capital to do what this organization has done. That is true, but a firm foundation of a similar nature can be built with small capital, but with the same ideals. In such a case, the development would be similar to that of the Spencer Metal Products Company described recently in *AUTOMOTIVE INDUSTRIES*. The plant itself must then begin on a very small scale, and must develop in conjunction with the community. The chief point is that the working force of the plant needs to be in some reason-

able proportion to the facilities of the community for providing opportunity for a decent and broadening existence to the majority of workmen.

It has been pointed out that such a foundation as laid by C. Harold Wills at Marysville gives excellent promise of a successful industrial relations policy. The foundation is a large factor. It is not, however, the only factor, by any means. In any situation, such as this, there is the same possibility for exceptionally bad development of human relationships as there are for exceptionally good ones. The situation in Maryland mining towns may be cited as a glaring example.

Interdependent Units

The interdependence of the units of modern industry, previously referred to, is already being illustrated by the coming of other manufacturing plants to Marysville. The Athol Manufacturing Co., manufacturers of automobile fabrics for tops and upholstery, has built a plant near to the automobile factory, and will manufacture products chiefly for the Wills company.

The Illinois Tool Co. has erected a plant to manufacture tools, jigs and fixtures, and began operations in December. Transue-Williams Co., Aluminum Manufacturers, Inc., are other newcomers. The Marysville Supply Co., which supplies material to the home builders, and an Edison Company power plant will also bring additional workmen and other labor policies to the new attempt at making and operating a model industrial community in this country.

But upon the firm foundation such as has been laid at Marysville, there is every opportunity for the application of those factors of fair-play, utter honesty, and fundamental justice in administration of personnel work that go to make up a really successful labor policy. Both the present status and the future development of the Marysville community are worthy of serious and thoughtful attention. The development of such an intelligent and seriously applied "big idea" is always worth following.

Noted Artists Portray "Spirit of Transportation"

RATHER an unusual hotel attraction for the automobile shows will be provided this year in the form of twelve paintings entitled "The Spirit of Transportation." The paintings are being made by twelve artists, each of whom is well known in his particular type of work. The purpose of the paintings is to visualize in a vivid and dramatic manner the place of the automotive industry in transportation and its relation to the economic and industrial life of the world.

The artists represent portrait, landscape, figure, marine, and mural artists, etchers, and also popular illustrators. They are doing this work at the instance of the Clark Equipment Company, and each has portrayed in his own way "The Spirit of Transportation."

The paintings will be on exhibition in the main lobby of the Hotel Commodore during the New York show, and will also be exhibited during the Boston and Chicago shows.

The artists whose work is represented in this prize competition have been selected from the prominent and talented artists of America representing the four branches of art as follows:

Portrait, Marine and Landscape Painters—George Elmer Browne, Jonas Lie, Max Bohm.

Illustrators—Frank X. Leyendecker, C. Coles Phillips, James Cady Ewell.

Mural Painters—Maxfield Parrish, Alphonse Mucha, F. Luis Mora.

Etchers—Franklin Booth, R. F. Heinrich, William Mark Young.

Added interest is given to the exhibit due to the fact that in addition to the remuneration which each artist has received for his painting, a competitive interest has been awakened among them by reason of a capital prize of \$1,000, which will be awarded the artist whose painting is esteemed the best. A Jury of Award consisting of the leaders of the automotive, marine, and railway industries will view the paintings while on exhibiton and will award the prizes.

The second prize is a Silver Medal of Honor and to the third goes Honorable Mention.

This effort is an attempt to bring home to the nation the vital part which transportation as a whole and automotive transportation in particular has played and will play in the development and progress of civilization and has in this manner shown its appreciation of the contributions to transportation and world advancement made by the American automotive industry.

during the past year has been in the interest of the automotive industry. The Automotive Power Plants Division is engaged in this work exclusively, and the new appropriation schedule prepared for Congress makes provision for considerable new equipment needed by this division. We are certain that the appropriations asked for will have the approval of the automotive industry.

Importance of Human Relations

THE use of the human relations idea in the advertisement of a prominent lathe manufacturer was commented upon some time ago in AUTOMOTIVE INDUSTRIES as significant of the importance now being attached to this phase of production by practical employers and executives.

Another example of this same tendency appears in a recent advertisement of the General Electric Company in *Iron Age*. This advertisement bears the caption—"Specialized industrial training eliminates mistakes that are costly in time and material." The text goes on to develop this idea and is illustrated with photographs of the training school for arc welders that is being operated by this company.

It is worthy of note that, even at this time of comparative business depression, the necessity for training men and building up an effective working force is being considered as of paramount importance by many successful manufacturers.

The "Saturation Point"

ONE of the bugaboos of the automobile trade for some time past has been the "saturation point." We have never seen it stated in print that this had been reached or was about to be reached, but, on the other hand, we have come across emphatic asseverations to the effect that it was nowhere in sight.

Now, just what is meant by the "saturation point"? The term "saturated" is used in science and industry in at least two entirely different ways. In chemistry, for instance, when we speak of a saturated solution, we mean a solution which under the particular conditions of temperature and pressure will hold absolutely no more of the material in solution. On the other hand, we speak of a magnetic circuit as becoming saturated when the increase in the induction ceases to be proportional to an increase in magnetizing force. It is then still possible to materially increase the induction, but it requires more effort for a certain increase than before.

The second phenomenon mentioned is no doubt a better parallel than the first to the condition which we will have to face in the automobile industry. We will never reach a point where it will be absolutely impossible to increase the number of cars in use, but the time must come when it will be more difficult to sell cars that represent an increase in numbers. This is entirely aside from temporary fluctuations in the market due to the state of general prosperity.

Naturally, as the automobile became a practical

vehicle, the people most in need of rapid road transport and those best able to pay for it—perhaps the sequence should be the other way round—were sold first. Improvements in design and manufacturing processes constantly increased the automobile's potential field of usefulness. To-day in some sections of the country automobiles are in such extensive use that there are relatively few people left who can afford a car and still do not have one. But where in some states there is one car to every five or six people, there are other states in which the proportion is only one car to forty people. There is, therefore, still room for many additional cars, even on the supposition that in states like Iowa and Nebraska the saturation point has been nearly reached.

It should be emphasized, however, that the attainment of the saturation point does not mean the doom of the automobile industry. It only means that the industry is settling down to a stable basis. Practically all road transport will then be by motor car, and the industry will have before it the enormous task of supplying repair parts for the twelve, sixteen or twenty million cars—whichever turns out to be the number required for the road transportation of the Nation—and of replacing 10 per cent or more of these vehicles annually.

The "saturation point" should really not be the bugaboo that it apparently is, because when that point is reached the automobile industry will be on the same plane with other industries devoted to the production of prime necessities, many of which are normally in a prosperous state.

Index to Vol. XLIII

THE time has arrived for another edition of the volume index of AUTOMOTIVE INDUSTRIES. The current index will be the third that we have issued separately from the regular copy of the magazine. We are quite glad to supply this index to any subscriber who may feel the need of it and only your name and address is needed to bring it to you. We have preserved the list of those who requested the Vol. XLII index in July and to this list we will send the Vol. XLIII index as soon as it can be printed, which we hope will be early in January. Printing conditions are better than in case of the two recent issues of this index and we hope to serve you more promptly. Even if you received the last index, it will do no harm to send in your name again as a check on the list we have prepared.

THERE is on the editorial desk this year a higher stack of Christmas cards and greetings than ever before. We see in this an indication of more sentiment in business; a more general desire to meet with business acquaintances in good fellowship. These cards are in excellent taste and the sentiment is wholesome. AUTOMOTIVE INDUSTRIES' staff has enjoyed receiving these greetings. We believe that business is better for this annual injection of sentiment. May it increase.

Our greetings to you are for a happy and prosperous 1921.

Setting Completed for New York Show

"Business as Usual" Theme of Meetings—Social Features to Be Attraction

NEW YORK, Dec. 29—Every element of the automotive industry in New York is making ready for "show week" starting Jan. 8, and about all that remains to be done is to raise the curtain. There is every indication that more dealers and manufacturers will attend than ever before and they will be kept busy from morning until late at night. "Business as usual" will be the main theme of all the scores of meetings which have been arranged but it is realized that most of the men who are coming have been thinking of business so much of late that their heads ache and plenty of amusement will be provided for them for a change.

Dealers are coming to the convention in droves. Many of the manufacturers have intimated to their sales organizations, politely but pointedly, that it would be well for them to get to the shows this year. They can't fail to get inspiration from them and are expected to go home with the firm resolve to "get back to business." Everything possible will be done to put them in this frame of mind. One of the important factors leading to this end will be numerous meetings at which speakers who can hit from the shoulder will tell why there is nothing to worry about and how the public can be sold on the essentiality of automobiles.

Dealer organizations in different parts of the country are preparing to join in the advertising campaign which is designed to convince everybody that automobiles are transportation and not luxuries. This movement is not confined to the largest cities. The Milwaukee Dealers Association plans to spend \$10,000. The Topeka association has decided to do something and the dealers in New Haven intend to get in the procession.

Hotel Rates at Usual Levels

New Yorkers always have been interested in passenger car shows and this year is no exception. They are going to do everything they can to make the visit of the automobile men pleasant, at the same time reaping a modest profit. Thanks to the efforts of the National Automobile Chamber of Commerce and the Motor and Accessory Manufacturers Association, however, the hotel proprietors have taken off their pirate garb and agreed to keep rates at the usual levels. It was explained to the owners of the largest houses that there are hundreds of perfectly good hotels in perfectly good locations on side streets that would be glad to get patronage at reasonable prices if the big hosteleries were unreasonable and this had a salutary effect.

Special automobile entertainment will be provided in all the cabarets and in the hotel restaurants. The motion picture

MEETINGS AND BANQUETS SCHEDULED FOR WEEK OF NEW YORK SHOW

MONDAY, JAN. 10

10:00 am. and 2 pm.—Automotive Service Associations Convention, Hotel Commodore.
2:30 pm.—Rubber Assn. of America Annual Meeting, Yale Club.
7:00 pm.—Rubber Association of America Banquet, Waldorf-Astoria.

TUESDAY, JAN. 11

10:00 am.—N. A. C. C. Foreign Trade Committee Meeting, N. A. C. C.
10:00 am.—N. A. C. C. Patents Committee Meeting, N. A. C. C.
10:00 am. and 2 pm.—Society of Automotive Engineers, Standards Committee Meeting, 29 West 39th St.
10:30 am.—N. A. C. C. Highways Committee Meeting, N. A. C. C. headquarters.
2:30 pm.—N. A. C. C. Motor Truck Committee Meeting, N. A. C. C.
7:00 pm.—National Automobile Chamber of Commerce Banquet, Commodore.
8:00 pm.—Society of Automotive Engineers, Aeronautic Session, 29 West 39th St.

WEDNESDAY, JAN. 12

10:00 am.—N. A. C. C. Directors' Meeting, N. A. C. C. headquarters.
10:00 am.—Society of Automotive Engineers Meeting, 29 West 39th St.
2:00 pm.—Society of Automotive Engineers, Body Engineering, Aeronautic and Chassis Sessions, 29 West 39th St.
2:00 pm.—Motor and Accessory Mfg. Assn. Annual Meeting, Commodore.
7:00 pm.—Motor and Accessory Mfg. Assn. Banquet, Commodore.
9:00 pm.—Society of Automotive Engineers Carnival, Hotel Astor.

THURSDAY, JAN. 13

10:00 am.—Society of Automotive Engineers, Fuel Session, 29 W. 39th St.
2:00 pm.—Society of Automotive Engineers, Fuel and Highway Sessions, 29 West 39th St.
7:00 pm.—Society of Automotive Engineers Banquet, Hotel Astor.

houses will flash automobile films on the screens and the stores will display automobile togger. The New York dealers will hold open house all week in their club rooms.

The manufacturers will be just as busy as the dealers for the "big four" associations will hold their annual meetings as well as all kinds of group sessions. There will be some kind of business meeting both interesting and profitable for every car, tire and parts maker and every engineer. The banquets starting Monday night will be a big entertainment feature.

Rubber Association Program Set

The first feast will be that of the Rubber Association of America. There will be three speakers, including P. E. Blondin, postmaster general of Canada, and Congressman Fish of Ohio. The third has not been announced.

The N. A. C. C. will feast Tuesday night. There will be two speakers, one of them James Schermerhorn, editor of the Detroit News. It is practically certain the other will be one of the real leaders of industrial life in America. There will be the usual stunts and a song leader who could put "pep" into a funeral.

The banquet of the M. A. M. A. promises to be a lively session. The only problem to be considered will be that of food and there will be no speakers but there will be SOME entertainment. It will be under the direction of the theatrical man famous for the production of musical shows with the most beautiful chorus girls. He has offered the services of his feature acts.

The annual meeting of the M. A. M. A. will be held Wednesday and in addition to the usual business there will be an innovation in the form of an open forum.

This will be a general discussion of the association's activities. The speaker at the meeting will be George M. Graham, vice-president of the Pierce-Arrow Motor Car Co. No long, formal reports will be presented. To stimulate interest in the show "on to New York" committees have been formed in Detroit, Chicago, Cleveland, Buffalo, Akron and Indianapolis and they will compete for the honor of having the largest delegation present. It is expected that close to 400 manufacturers will be in the city for the week, representing every important automobile and equipment plant.

Details of the annual dinner and frolic of the S. A. E. on Thursday night have not been arranged but there will be several speakers and the banquet will be followed by a dance.

M. A. M. A. Gives Sanction to Minneapolis Exhibit

NEW YORK, Dec. 29—The Board of Directors of the Motor and Accessory Manufacturers Association has sanctioned the Northwestern Automotive and Industrial Exposition to be held in Minneapolis, Feb. 5 to Feb. 12. The show will be housed in the mammoth new building of the Northwest Terminal Co. This is conveniently located and adapted for a show of large proportions.

Preliminary indications point to a record breaking demand for space at this show from the parts, units, and accessory manufacturers affiliated with the Motor and Accessory Manufacturers Association. The dominant position of Minneapolis in relation to the Western and Middle Western automotive markets makes this show of unusual significance and value to the industry.

Newspapers Break Ban on Publicity

**Globe and Mail to Resume
Former Policy—All Open
for Show News**

NEW YORK, Dec. 29—Publishers of New York newspapers who banded together several months ago to curb automobile publicity are breaking away from this agreement and two of them already have filed declarations of independence. These papers are the Globe and Evening Mail.

Jason Rogers, publisher of the Globe, has informed his fellow publishers that while he will stay with them on questions of publicity for other interests which are not entitled to it, publication of automobile news will be left hereafter to the discretion of his automobile editor, George Severin.

The Evening Mail will resume its former editorial support of the automobile business. John C. Wetmore, dean of newspaper automobile editors in this city has mailed notices which say:—

"I am pleased to announce that during and after the coming motor truck and passenger car shows in this city, Jan. 3 to 15, 1921, The Evening Mail will resume its long-time policy of publishing daily the latest and fullest news of the automobile industry and sport. The resumption of this policy will enable The Evening Mail to continue and emphasize its unrestricted support of the motor car trade, which has been a conspicuous feature of the paper in its daily automobile column, conducted for 16 years by me as the successor of men of such prominence in the sport and industry as Malcolm Ford, Alfred Reeves and A. G. Batchelder, its former editors."

The publishing association announced some time ago that the bars on publicity would be down for automobile show week and many of them will publish daily stories next week in regard to the automobile industry.

Stockholders Ratify Management Plans

(Continued from page 1343)

ferred, and including reserves for contingencies, \$42,696,243 leaving net assets after payment of all liabilities to be applied to the outstanding capital stock, of \$110,380,596. This shows net assets sufficient to pay the entire outstanding preferred stock in full at \$100 per share and still leave \$44,247,073 for the common, which would mean a book value of \$73.87 per share. In this audit the good will of the company, which is undoubtedly large, was not considered at all, and all raw material, including rubber and fabric, was invoiced at its market value regardless of what it cost.

The stockholders who attended the meeting in person numbered about 1200 and there were represented by proxy 498,129 shares of preferred and 546,363

shares of common. A resolution was adopted giving the consent in writing of the preferred stockholders to the issuance of not to exceed \$50,000,000 in first mortgage bonds or notes to run twenty-five years at 8 per cent interest. The preferred stockholder vote on this resolution was 499,371 shares in favor of it and 1120 shares against.

Another resolution on which both the preferred and common stock voted, authorized the directors to issue these bonds or notes and execute a mortgage on the property as security. Only 987 shares of preferred stock voted against this resolution and none of the common voted in opposition.

Bonds To Pay Indebtedness

President Seiberling stated that the proceeds of these bonds or notes will be used to pay the present indebtedness and provide additional working capital. He reported that negotiations for permanently financing the company were in progress and that action on them will be taken at another meeting, Dec. 29.

G. M. Stadelman, vice-president in charge of sales, told the stockholders that sales reached their lowest ebb in November and that since that time they have been steadily increasing.

When Monnett objected to approval being given the bond issue because the auditing committee of the stockholders had not checked up the report of the accountants, Judge E. W. Stewart of Akron declared no committee could intelligently audit reports which it had taken skilled auditors weeks to prepare. Immediate sale of the bonds was approved when President Seiberling said a New York house would take over the entire issue. Although he mentioned no names it is assumed he referred to the syndicate headed by Goldman, Sachs & Co.

Goodrich Celebrates Fiftieth Anniversary

AKRON, Dec. 30—The B. F. Goodrich Rubber Co. is commemorating the fiftieth anniversary of the founding of the company by Benjamin Franklin Goodrich, Dec. 31, 1870, by getting out a 48-page booklet, entitled "Golden Year of Goodrich," in which is reviewed the history of the rubber industry and its part in the progress and development of the world.

The founder died before the invention of the automobile, but he lived to see rubber adapted for many purposes, the climax of his endeavors being the evolution of tires for bicycles. Since its first location in Akron the plant has spread from a two-story brick building, 40 x 100 ft., to a group covering 110 acres.

THOMAS LEAVES HYDRAULIC

CLEVELAND, Dec. 29—Owen Thomas has resigned as general manager of the research engineering department of the Hydraulic Steel Co., where he has been for two years, and has opened offices for automotive consulting engineering at 1900 Euclid Avenue, this city.

Westinghouse Unites Automotive Sections

**Centralizes Equipment Department in New Springfield
(Mass.) Headquarters**

SPRINGFIELD, MASS., Dec. 27—The automotive equipment department of the Westinghouse Electric & Mfg. Co. has completed plans to increase the efficiency of its service to car manufacturers, distributors of parts, and car owners. Heretofore, owing to conditions brought about by the war, the main sales office of this department, the works, the engineering division and service division were all located in different cities. Now all divisions have been established here, and this centralization is expected to be advantageous to the company and to its automotive customers.

For manufacturing, a modern plant, entirely specialized, has been completed at Springfield. The installation of new machinery in the new works and foundry buildings is completed, and provides capacity for five years' estimated growth.

The building itself is of a single story, saw-tooth construction, and measures 100 x 1000 ft., with two projections, each 80 x 20 ft. It is constructed of concrete and steel, with a concrete floor built to withstand heavy traffic, and a cement tile roof entirely enclosed with metal sash glass.

The allotment of the floor space by the different departments and the tool layout was determined by the planning department, under the supervision of A. B. Reynders, works manager, at the time ground was broken. The general assignment of space is as follows: Machining section, 33-1/3 per cent; armature and coil section, 25 per cent; special accessories, 16-2/3 per cent, and finish assembly and test, 25 per cent.

The automotive engineering department, under charge of R. G. Thompson, is located in the plant. There are two main divisions, one of which has charge of the design of new apparatus and the other with the application of existing apparatus to automobiles.

Sales and Service United

A three-story building at 82 Worthington street, together with the third floor of the adjoining Post Office Square Building, houses the general sales department, with its commercial engineers, the service department and the stocks of supply parts.

The purpose of the service department, which is in charge of M. B. Speer, is to give any necessary assistance in repair and maintenance of Westinghouse automotive equipment, the correction of troubles that may arise, and the distribution of supply parts to service stations.

The sales department is headed by G. Brewer Griffin. Sales offices are maintained in Chicago, Detroit, Indianapolis, Cleveland and Springfield.

Ford Plant to Stay Closed Till February

Lack of Orders Declared Responsible for Continued Suspension of Operations

DETROIT, Dec. 29—Instead of resuming operations Jan. 3, as planned, Ford Motor Co. has posted notices to employees stating that operations will not be resumed until Feb. 1. While not officially declared, lack of orders was said to have determined the company to continue its suspension of work for an additional month.

There are 60,000 employees in the Highland Park, River Rouge, and Dearborn plants of the company, all of whom are thrown into temporary enforced idleness. Bonus checks for 1919, totaling approximately \$8,000,000, will be mailed to employees this week.

Opinions differ on the effect of the Ford action. Emory W. Clark, president of the First and Old Detroit National Bank, declared it would exert but slight influence on business in general. He believed it would be beneficial because it would permit dealers to dispose of their surplus stocks and thereby stimulate demand, which would be reflected in other lines. He thought other plants would reopen on schedule and said few parts makers were entirely dependent on Ford.

Clark asserted the Ford closing would have little effect on business because most of the employees are thrifty and have snug savings bank accounts. Detroit savings accounts reached their peak in October with \$215,000,000, and only \$6,000,000 had been withdrawn up to Dec. 24. At least a third of the withdrawals was for Christmas shopping.

On the other hand, Frank G. Smith, vice-president of the same bank, asserted the Ford closing could not fail to have a depressing effect and that further withdrawals of savings would tighten the money market. He believed other plants might take action similar to Ford's.

Vice-President Haynes of Dodge Bros. declined to make any statement on the plans of that company for reopening.

Would Relieve Wage Bugaboo

Lawrence Fisher of the Fisher Body Corp. said the Ford action would be beneficial to the industry in that the minimum wage schedule in effect there would not cause other manufacturers to feel compelled to meet it. Wage cuts as heavy as 20 per cent, he said, could now be made. A bad effect of the continued suspension would be the added feeling of depression to all branches of the industry. He feared the suspension would have a tendency to delay the resumption of demand.

Actual damaging effects would be felt by parts makers, he said. Fifteen per cent of the Fisher business was with Ford he said, and curtailments in their

employee staffs to this extent would be made. A definite revision of wage schedules would be announced Monday, he said, when many plants resume.

Whether plants making parts for the Ford company would follow the Ford action and continue the closing of their plants beyond Monday was not commented upon by officials. At the Ford plant officials would give no indication of probable wage rates when operations are resumed, nor whether the minimum wage rate would be lowered.

Dodge Plans Sharp Revision

It is reliably reported that Dodge plans sharp revisions of wages and will also continue on its reduced schedule of operations indefinitely. W. J. McAneeny, president of Essex, said he could see no reason why the Ford action should have an effect on other manufacturers.

H. M. Jewett, president of Paige, said Ford dealers were overloaded as a result of the continued heavy production. Ford, he said, must now sweat awhile and give his dealers a chance to clean-up. The Paige plant will reopen Monday with half of the regular force employed. No statement would be made as to the extent of wage cuts.

G. M. C. Directors Meet; Dividend Change Likely

NEW YORK, Dec. 30—Directors of the General Motors Corp. are meeting this afternoon and it is expected some action will be taken on dividends. It is not expected payments will be passed but it is considered practically certain that payment of a quarterly stock dividend on the common will be discontinued, although there may be a slight increase in the cash disbursement on this stock. This will be the first formal directors' meeting since the retirement of W. C. Durant from the presidency and considerable interest attaches to it for that reason. There has been much speculation as to whether any plan would be considered for the stimulation of sales.

Pierre S. duPont, the new president, has devoted most of his time to the company for the past three weeks and is in almost constant conference with heads of departments, especially those in the sales end. He has held frequent consultations with Durant since the latter's return from the South the week before Christmas.

AUSTRALIAN ENGINEER HERE

NEW YORK, Dec. 29—G. Hamilton-Grapes, A.M.I.A.E., consulting automobile engineer of Melbourne, Australia, is in this country at present to buy automobile parts and to study the shale oil industry and the manufacture of motor fuels in general. Grapes is a member of a technical committee of the Institute of Science and Industry of the Commonwealth of Australia. He is very much interested in the development of a domestic fuel for Australia, and will attend the fuel session of the S. A. E. during the coming New York meeting.

A. E. F. Tires to Lose Adjustment Rights

Manufacturers Will Oppose Disposition Here As First Class Merchandise

NEW YORK, Dec. 29—The sale of large quantities of deteriorated A. E. F. tires and tires made for the French military forces, known to have been made in France to representatives of a syndicate of New York and Chicago jobbers who plan to sell them here, has aroused American manufacturers to action designed to prevent their being sold as first class merchandise.

The number of tires involved is now being investigated by the Rubber Association. They are said to comprise both pneumatics and solids, apparently new and bearing the serial numbers of five American tire makers. None were manufactured less than two years ago and many are believed to be considerably older.

Through deterioration of material, because of age and general exposure, the manufacturers will withdraw all adjustment privileges from these goods. Serial numbers have been kept on which adjustments will be denied and manufacturers seek to prevent imposition on the public by compelling the sale to be made with all the facts known.

Purchases of the tires are being made through French brokers who have taken over the sale for the Government. Prices for which they are obtained are said to be very low and this, too, is being investigated. Arrangements have been made for immediate shipment to the United States and a consignment of 2500 has been landed.

No stipulations were made in the sale of A. E. F. material to the French Government that the supplies could not be offered for sale in the American market. Thousands of American cars were included in the supplies turned over, but no reports have been received of the disposition of the cars.

ALUMINUM TARIFFS OPPOSED

NEW YORK, Dec. 29—Representatives of the National Automobile Chamber of Commerce and the Motor and Accessory Manufacturers Association will appear before a House committee in Washington Jan. 12 to protest against a proposal to increase the tariff on aluminum. It will be contended that present prices are high enough and that there is no justification to hold them up or make them higher by raising tariff barriers. The N. A. C. C. already has gone on record as favoring a lower tariff on automobiles. This stand has been taken on the ground that it would stimulate business in foreign markets and that American manufacturers are abundantly able to take care of themselves when it comes to competition at home from foreign makers.

British Depression Ascribed to Taxes

Former Minister of Finance Warns Armament Expenditures Must Be Reduced

LONDON, Dec. 10—(*Special Correspondence*). Some weighty addresses have been given by recognized British finance authorities which cannot be ignored by the trades at large, and especially such as the automotive trades, which are so largely dependent on general trade stability and prosperity for their own existence.

First Sir George Paish, a leading British finance authority, who acted in the United States as a financial intermediary during the war, has warned the public that with the £ at 30 per cent and the franc at 70 per cent below par, and America no longer willing to finance British business, the situation is approaching a condition pointing to a breakdown of commercial deals.

Now comes a similar warning from Reginald McKenna, formerly Minister of Finance in the British Government and now head of one of the leading banking corporations who confirms the Paish warning and points out, contrary to common belief, that the only means of bringing down prices is by increasing production, that recent figures show the contrary to be the case.

He instances the period from June 1919 to June 1920 during which prices rose 27 per cent while purchasing power increased by not more than 6 per cent, whereas production during that period was much greater than at the beginning. He attributes the present situation to the effect of excessive taxation which while it increases purchasing power does so at the expense of production. The cumulative effect he said is to drive up prices so that people have nothing to save, or alternatively to invest, whether in the business concerned or in stocks or in motor cars, and consequently the heavy taxation is restricting enterprise. Before the war Britain saved about 25 per cent of the yearly national income. Finally he warned European countries that to go on spending on armaments was not merely to exhaust resources, but actually to destroy the world.

FUEL COMPLAINTS HEARD

WASHINGTON, Dec. 29—One complaint against a manufacturer of automobile oils was issued and another dismissed by the Federal Trade Commission to-day. The commission announced the dismissal of its complaint of unfair competition against the Great Western Oil Co., Cleveland, O., with respect to certain untrue advertising of a motor fuel put on the market by this company. The company conceded the use of the advertising charged, which was discontinued prior to the issuance of the complaint.

Upon application for the issuance of a complaint the commission has cited the

Carbo Oil Co., Cleveland, O., in complaint of unfair competition in the manufacture and sale of motor lubricating oils. The complaint alleges that a certain automobile lubricant marketed by a long established concern has become well known to the trade and that the Carbo company in attempt to imitate this product has compounded and placed on the market a product known as "Mobile A Oil" and represented this oil as the product of its competitors.

Clark Company Makes Speed Wagon Axle

CHICAGO, Dec. 27—A new speed wagon axle of the bevel gear type has been put in production by the Clark Equipment Co. of Buchanan, Mich. This axle is intended for use only on trucks of one ton or less. It has a pressed steel load carrying member or housing, and the differential is supported in a carrier and can be removed from either the front or rear of the axle. Radial and thrust loads are taken on Radax ball bearings.

The wheel bearings are of the straight roller type and take thrust in both directions. They are so mounted that the thrust on each wheel is taken care of independently by its particular bearing, rather than transmitting the thrust in the direction of the wheel bearing on the opposite side. Taking the thrust in both directions on one wheel bearing tends to eliminate wobble and wheel looseness.

The hub is mounted on a 6-splined shaft, and when it is drawn up tightly it clamps the inner race of the wheel bearing. Brakes are internal, 2½ in. wide, of special design, using four shoes to each wheel. The brake parts are bushed with oilless bearings, and are easily replaced when worn. This axle is designed to carry 3000 lb. on the spring pads, and to take care of a 1600 inch-pound torque motor. Two standard gear reductions can be furnished, viz., 5.9 and 6.2; the 6.2 reduction being obtained with spiral bevel gears. The weight of the axle is approximately 360 lb. complete with hub parts.

Maxwell to Continue Newcastle Parts Plant

NEWCASTLE, IND., Dec. 28 — Rumors to the effect that the Newcastle plant of the Maxwell Motor Co. will not be reopened were refuted last week when three officers of the company, W. Ledyard Mitchell, president; A. E. Baker, general sales manager, and A. A. Richmond, general superintendent of the service department, were here inspecting the factory.

President Mitchell said here that the assembling plant at Detroit is to start at once assembling fifty cars a day, and that as soon as the present supply of parts is used up it will be necessary to put the Newcastle plant in operation again. In addition to this, the forge work and other parts for the Chalmers will be done here.

METAL MARKETS

ALTHOUGH the last week of the year is one of inactivity even in the so-called "good iron years," and 1920 will be recorded as one of the "bad years" in spite of the price boom of the first half, sentiment in the pig iron as well as in the steel and non-ferrous metal markets is rather optimistic than otherwise. One is tempted to speak of the good "morale" of the markets; this would be misleading, however, for the simple reason that, especially in the pig iron market, sellers have become accustomed to praise the market for its "morale" when there is unanimity in adhering to prices no matter how much out of gear they might be with those for related commodities. Improvement in sentiment lies in the genuine eagerness of producers to book 1921 business at any sane figure. Broadly speaking, wages have been cut at least 20 per cent, and with the turn of the year sufficient will be clipped from off the "overhead" to make possible modest profits on the market's readjusted basis. Where wages have not been cut, as for instance in the case of the Steel Corporation, it is taken for granted that the backlog of orders in hand is sufficient to warrant postponement of the day of downward revision. Should the pace at which orders are placed during the first month or two in the new year be exceedingly slow, it will be only natural that preparations for further price reductions as an inducement to buyers will be seriously considered, and one of the first steps in this connection would, of course, be to bring wages more into line with the anticipated cuts in prices. The chastening effect on the pig iron market exerted by cheap offers of 1.75 to 2.25 silicon iron by a prominent Michigan automotive interest has resulted in energetic competition for all the first half year business which may be secured from automotive foundries. There is little doubt that the next few weeks will witness considerable activity in all of the markets, although no one looks for spectacular buying.

Pig Iron—Small tonnages of 1.75 to 2.25 silicon iron are reported to have been taken on by automotive foundries at \$30, Detroit furnace. This pig is supposed to be from the Ford furnaces at River Rouge, although there is no certainty on this score and the resale market is still in fair, odd lot supply. Furnace coke can now be obtained on contract at close to \$5. With sliding scale contracts for furnace coke reported on a 5 to 1 basis (the buyer to pay one-fifth the prevalent basic iron quotation for a ton of coke), a \$5.50 coke market would certainly imply a relatively easy tone in a \$30 pig iron market.

Steel—Although most of the steel makers look to the railroads for the principal tonnages that will be bought in the first quarter of the new year, tentative inquiries show that orders for modest amounts of steel are likely to be placed by the automotive industries before February 1. Independent makers of hot-rolled strip steel now quote 3.30c. Prices, otherwise, are unaltered.

Brass—Connecticut valley brass mills continue to operate on a greatly curtailed basis, but gradual revival in the demand from the automotive industries is looked for after the first of the year.

Tin—Support by the Federated Malaysian Government and improvement in the exchange situation act as a prop for the otherwise highly speculative market.

Copper—Weak, speculative holders have been obliged to liquidate at around 1c. a lb. below the quotation of 14c. named by large producers.

Aluminum—There is still much cheap foreign and resale metal on the market with automotive buyers rather apathetic.

Lead—Although consuming demand is light, the market seems to have dipped close to bottom.

Zinc—Only fairly steady with consumers rather offish.

FINANCIAL NOTES

Reo Motor Car Co. stockholders have authorized an increase in capitalization from \$10,000,000 to \$15,000,000. No stock dividend was announced, business conditions being such that it was not considered advisable. Directors may take such action at any time without necessity for a further meeting of stockholders. R. C. Rueschaw succeeded R. H. Akers on the board.

Hood Rubber Co. directors have declared a dividend of \$1 a share on the new no par value common stock, payable Dec. 31. This is at the rate of \$4 a year, equal to \$8 dividend rate on the old stock, which was exchanged for the present stock on the basis of two shares for one.

Autosales Corp. for the ten months ended Oct. 31 shows net income after charges and Federal taxes of \$118,035, equivalent to \$2.22 a share (par \$50) earned on the \$2,656,150 preferred stock. Assets of the company total \$7,575,414 and its surplus over liabilities is \$381,729.

Tock Screw Machine Products Corp. has been succeeded by the Automatic Products Corp., taking over its assets and assuming its liabilities. There will be no changes in the personnel, but the company will be reorganized upon a larger financial basis.

Silver Steel Casting Co., Milwaukee, has doubled its capitalization, which is now \$800,000, the new stock issue being absorbed by present owners. The new capital is to provide for expansion and to finance the growing production.

McGraw Tire & Rubber Co. will pass its usual quarterly dividend on preferred stock to conserve the cash resources of the company. This action was voted upon at a meeting of directors in Cleveland.

Cox's Pneumatic Cushion Co. stockholders will meet Jan. 5 at Phoenix, Ariz., to elect directors and approve the action of the director board in leasing company patents to Henry Seibel.

United States Light & Heat Corp., Niagara Falls, N. Y., has been authorized by stockholders to issue \$1,500,000 preferred A stock.

Briggs & Stratton Co., Milwaukee, has increased its authorized capital stock from \$1,700,000 to \$1,950,000.

Moore Motors Plant Sold for \$54,807.09

DANVILLE, ILL., Dec. 27—The Moore Motor Vehicle Co. of this city, which has been in financial difficulties for the past six months, was sold at public auction for \$54,807.09 to the American Building Association of Danville. The price represented the mortgage held against the plant by the American company. The bid accepted included 53 acres of land, all of the buildings and the contents of the buildings. The Goldberg Supply Co. of St. Louis bid \$35,000 for the land and empty buildings and \$12,000 was bid for the machinery, making a total of \$47,000. As the bid of the mortgage holding company was far the best, it was accepted by the receiver.

The sale was made in compliance with an order from the Federal court to close up the affairs of the Moore company. The original appraisal of the value of

the land, buildings, contents and other chattels was \$136,000. It is now evident that the figure was too high and this means that the stockholders will realize little or nothing from their investment.

Captain Charles Cox and George Bennington, both of Chicago, are negotiating for a lease of the defunct Moore Motor Vehicle plant to manufacture airplanes. They have found that the wood-working department is exactly suited to their needs. The two promoters have prepared plans for a passenger airplane and should the initial construction prove a success, it is proposed to manufacture them upon an extensive scale. It is likely that the lease can be effected as the construction can be carried on without interfering with the manufacture of motor vehicles.

Van Briggie Head Sued by Company Receiver

INDIANAPOLIS, Dec. 28—Suit to obtain \$275,000 from Lilburn Howard Van Briggie and Frances Mary Van Briggie, his wife, alleged to have been obtained fraudulently from the treasury of the Van Briggie Motor Device Co., has been filed in the local Circuit Court by William R. Hirst, receiver of the company. Van Briggie is president of the company, which went into receivership on petition of a number of stockholders several months ago.

The complaint charges that Van Briggie, as head of the company defrauded it of an amount aggregating more than \$243,000 by diverting company funds to his own use. The plaintiff asks a court order cancelling contracts for the payment of royalty by the company to Van Briggie, cancellation of title to real estate held by the defendants as tenants in entirety and sequestration of personal property held by defendants to be applied to the judgment. Many of the charges made in the complaint virtually are repetitions of those made by the stockholders who applied for the original receivership.

MURIEL WHITE KILLED

INDIANAPOLIS, Dec. 30—Friends of D. McCall White, designer of the La-Fayette car, are expressing their condolences on the death of his daughter Muriel in an automobile accident, Dec. 18. The child was thrown from an automobile in which she was riding with her father, mother and brother, when it was rammed by another car approaching from the left, and was killed instantly.

SOUTH AMERICA BUYS TRACTORS

INDIANAPOLIS, Dec. 30—The export department of the Midwest Engine Co. reports the signing of a contract with its South American distributor for 1000 utilitators. The policy of maintaining direct factory representation in foreign countries is working out satisfactorily, it was declared. A distributor will be appointed for the British Isles in the early part of 1921.

Bank Credits

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

NEW YORK, Dec. 28—There was little change in the money market last week. Funds were plentiful but due to the extensive liquidation in the stock market there was little demand. Call money ruled at 7 per cent, which has been the prevailing rate since the first of the month. The range, as in the week before, was from 6 per cent to 7 per cent. Time money held firm at rates slightly higher than those quoted a week ago. Sixty and ninety days' paper was quoted at 7½ per cent to 7¾ per cent and the longer maturities at 7 per cent to 7¼ per cent for loans secured by regular mixed collateral. All industrial loans were quoted at about ¼ of 1 per cent higher than these rates.

The week-end bank statements seem to indicate a return to this center of funds which all Fall have been flowing to the interior. The New York Reserve Bank improved its reserve position through an increase in total cash reserves of \$30,417,000. This gain was more than enough to offset increases of \$37,176,000 in total net deposits and \$9,348,000 in Federal Reserve notes in circulation at this center. The gain in cash reserves was, in the main, occasioned by an increase in gold reserves of \$29,357,000 as a result of large credits in the gold settlement fund. Total earning assets increased \$19,618,000.

The passing of the strain incident to the large tax payments was reflected in the condition of the New York Associated Banks. Loans were reduced \$36,251,000 as contrasted with an increase the week before of \$115,576,000 when there was a swelling of loans over the tax date.

While recessions in commodity prices were less marked again last week, the general slowing up of business is reflected in cancelled orders and decreased production, especially among the independent steel producers. The latter, it is said, are now operating at 30 per cent to 35 per cent of capacity. The U. S. Steel Corp. is maintaining production close to 90 per cent of capacity. An encouraging feature in last week's steel news was the placing of orders for 200,000 tons of rails by the Pennsylvania Railroad and 75,000 tons by the New York Central. The Pennsylvania order, which is much larger than its normal annual requirements, was distributed 50 per cent to the U. S. Steel Corp. and 50 per cent to independent producers.

WHIPPLE JOINS REPUBLIC

DETROIT, Dec. 29—A. J. Whipple, formerly general sales manager of the Diamond T Truck Co., has joined the Republic Motor Truck Co. as general sales manager. Whipple is a member of the truck committee of the National Automobile Chamber of Commerce and a former director of the National Association of Sales Managers.

MEN OF THE INDUSTRY

H. L. Dean has resigned as manager of the compressor and engine sales division of the Chicago Pneumatic Tool Co. J. F. Huvane has been appointed eastern manager of compressor and engine sales with headquarters in New York. G. C. Vanden Bloom has been appointed western manager of compressor and engine sales with headquarters in Chicago.

George Selbert has been named assistant sales manager of the William Small Co., Indianapolis, manufacturer of Monroe automobiles. He will make his first appearance with the Monroe sales force at the New York and Chicago shows. He was formerly with the Gray Dort Motors, Ltd.

J. A. Graham has resigned as Minneapolis branch manager of the Studebaker Corp., effective Dec. 31. Beginning in 1921 he will assume the position of vice-president and general manager of the Houdaille Co., Buffalo, in which he has acquired an interest.

John H. Dielmann and W. D. Dalton, for a number of years with the Weinstock-Nichols Co., Los Angeles have entered business for themselves as the John H. Dielmann Co., Los Angeles. They will act as agents for manufacturers.

Horace E. Eckhouse, 1834 Broadway, New York, has been appointed distributor of the "Wisoid" gaskets manufactured by the Consolidated Packing & Supply Co. of the same city.

William Mack, advertising manager of the Borg & Beck Co., Moline and Chicago, has been appointed sales manager of the company. His headquarters will be in Chicago.

Lewis L. Clarke has been appointed a member of the executive committee of the American-La France Fire Engine Co., Inc.

Brown Stockholders
Request Accounting

MOLINE, ILL., Dec. 27—Suit has been filed in the Rock Island County Circuit Court against the Brown Motors Co. by Sherman N. Johnson, Harry Ranson, Morris W. Battles, William T. Hinman, William McMullen, Earl L. Ewing and Calvin Ainsworth, asking for an accounting of the money paid into the treasury by the stockholders. In their bill, the complainants allege that the books of the defendant company have been transferred from the Moline office to Chicago and inspection requested by the stockholders has been refused.

It is further alleged in the bill that Walter E. Brown, inventor of the engine, whose production plant was to have been located in Moline, and president of the company which bears his name, has conspired to ruin the financial standing of the company to better his own ends. Representations are made in the bill that Brown holds the patent rights of an internal combustion motor, for the manufacture of which the company was organized Jan. 5, 1917.

Of the original stock of \$20,000, Brown was to receive 51 per cent for rights of manufacture. Subsequently, the capital stock was increased to \$50,000 and later to \$200,000. It is related

in the bill that Brown continued to vote himself the controlling interest through a board of directors of his own selection. It is further alleged that Brown is unlawfully claiming stock to the amount of \$132,000 and that he has drawn a large salary as president and general manager without corresponding service.

It is further averred that Brown has asked for the dissolution of the company. This is opposed by the minority stockholders and they will seek an investigation through the medium of the courts. The Brown motor was never manufactured in any considerable quantity but a large amount of the capital stock is held by investors of Moline and Rock Island. They will bitterly contest the proposal to disband the corporation until reimbursed for the money they subscribed for stock.

CHESTER E. CLEMENS DIES

CLEVELAND, Dec. 27—Chester E. Clemens, mechanical engineer of the Standard Parts Co., died Dec. 24, 1920, aged fifty-two years. He was born July 12, 1862, at Troy, N. Y. His experience was varied, having served successively as machinist, foreman and superintendent of the Ariel Cycle Co., Goshen, Ind. He next organized the Clemens & Curtiss Co., New York, and was its superintendent and manager. From here he went with Guiterman, Rosenfeld & Co., exporters of New York, as a buyer of machine tools and products. He was next connected with the Cycle & Tool Mfg. Co., Springfield, Mass., as engineer, and from there went to the Massachusetts Automobile Club at Boston, where he was master mechanic.

He next entered the employ of the Napier Motor Co. of America, which was also located at Boston, as an engineer, leaving there to accept the position of engineer of the automobile department of the St. Louis Car Co., St. Louis. He subsequently returned to his position as engineer of the Napier company, and from there went to Cleveland as mechanical engineer of the Perfection Spring Co. When the Standard Parts Co. was organized, Clemens became mechanical engineer of that organization. He was elected to member grade of the Society, Oct. 4, 1908.

CRAWFORD HEADS BOLLSTROM

ST. LOUIS, MICH., Dec. 24—F. W. Crawford was elected president of the Bollstrom Motors Corp. of this place, at the annual meeting at which directors were elected and the capital increased from \$200,000 to \$2,000,000. The directors discussed at length the prospects for manufacturing, and it was the consensus that a light, rapid truck was in greatest demand at this time, though no definite action as to manufacturing program was outlined. Directors elected in addition to Crawford were W. H. Hall, W. E. Barstow and Louis Martin of St. Louis; C. F. Berger of Saginaw, L. M. Russell of Merrill, and W. F. Markham of Alma.

INDUSTRIAL NOTES

Wayland Specialty Mfg. Co., Inc., is planning the erection of a \$200,000 plant at Wayland, N. Y., for the expansion of its manufacture of automotive accessories. These are put out under the name Wa-product.

J. B. S. Mfg. Co., Elmira, N. Y., has purchased the business of the Ellis Smith Mfg. Co., and the entire line of E. & S. products are now in production in its plant.

Republic Rubber Corp. has moved its New York office from 229 West Fifty-eighth Street to 221-23 West Thirty-seventh Street.

Medina Rubber Co. has started the erection of a new plant at Medina, Ohio, which is expected to be in production in April.

Surete Mfg. Co., Providence, R. I., manufacturer of a switching device, has changed its name to the Howard Mfg. Co.

Service Motors Builds
New Light Speed Truck

WABASH, IND., Dec. 24—A speed truck, designated as Model 15, the "Red Pyramid Speed Truck," of from $\frac{3}{4}$ to 1-ton capacity, has just been announced by the Service Motor Truck Co., after the completion of a 1200 mile experimental run, under the supervision of Chief Engineer Charles Guernsey and Experimental Engineer Malcolm Randall.

At the front end of the truck a semi-elliptic spring is mounted crosswise, the ends being carried on the axle and the center supporting the frame. This spring is pivoted at its central point, and the front axle is perfectly free to move about this pivot. Another feature of construction resides in the shackle bolts, which are drawn from a single sheet, and after being carbonized are finished in the usual manner. These bolts are of $1\frac{1}{4}$ -in. outside diameter and contain an oil reservoir $\frac{3}{4}$ -in. in diameter. The oil feeds by splash through felt pads from the reservoir to the working surfaces outside. The oil supply is replenished by lifting up the spring cap on the carrier and filling with an ordinary measure.

SAXON TAKES ON LUBRICATOR

DETROIT, Dec. 27—The Saxon Motor Car Co. has closed a contract with Roberts & Monroe, Inc., of Bridgeport, Conn., for the exclusive use of the Romon automatic chassis lubricator for one year. The show cars of the Saxon Motor Car Co. will be equipped with this apparatus, which is a centralized lubricating tank taking care of the bearings at all points of the chassis. The device, which has been described in these pages, consists of a box or tank containing a series of pumps operated by a hand lever in an accessible position of the car. Periodically, three or four strokes on the hand lever forces lubricating oil under pressure to all points of the chassis requiring lubrication. The installation of this device and its exclusive employment on the Saxon chassis will be featured by this concern at its New York and Chicago exhibits.

Calendar

SHOWS

- Jan. 3-8—New York, Motor Truck Show, Motor Truck Ass'n of America, Twelfth Regiment Armory.
- Jan. 8-15—New York, National Passenger Car Show, Grand Central Palace. Auspices of N.A.C.C.
- Jan. 10-17—Portland, Ore., Annual Automobile Show, Automobile Dealers' Ass'n, Municipal Auditorium, M. O. Wilkins, Mgr.
- Jan. 15-22—Philadelphia, Annual Automobile Show, Philadelphia Automobile Trade Ass'n.
- Jan. 17-23—Milwaukee, Annual Automobile Show, Milwaukee Automotive Dealers' Ass'n.
- Jan. 22-27—San Francisco, Second Annual Pacific Coast Automotive Equipment Exposition, Auditorium.
- Jan. 22-29—Baltimore, Annual Automobile Show, Baltimore, Automobile Dealers' Ass'n, 5th Regiment Armory, J. C. O'Brien, Mgr.
- Jan. 22-29—Cleveland, Annual Passenger Car Show, Cleveland Mfr's & Dealers' Ass'n, Wigmore Coliseum.
- Jan. 22-29—Montreal, Annual Automobile Show, Montreal Automobile Trade Ass'n, Motordrome Bldg.
- Jan. 29-Feb. 4—Chicago, National Passenger Car Show, Colliseum, Auspices of N.A.C.C.
- Feb. 5-12—Minneapolis, Annual Automobile Show, Minneapolis Automobile Trade Ass'n.
- Feb. 6-12—Columbus, National Tractor Show, Columbus Tractor & Implement Club, Ohio State Fair Grounds.
- Feb. 12-19—Hartford, Conn., Annual Automobile Show, Hartford Automobile Dealers Ass'n, Armory, Arthur Fifoot, Mgr.
- Feb. 12-19—Kansas City, Annual Automobile Show, Kansas City Motor Car Dealers' Ass'n.
- Feb. 14-19—St. Louis, Annual Automobile Show, St. Louis Automobile Mfrs & Dealers' Ass'n, Robt. E. Lee, Mgr.
- Feb. 14-19—Winnipeg, Western Canada Automotive Equipment Show.
- Feb. 18-28—San Bernardino, Cal., National Orange Show, Fred M. Renfro, Mgr.
- Feb. 19-26—San Francisco, Fifth Annual Pacific Automobile Show, Exposition Auditorium, George Mahlgreen, Mgr.
- Feb. 21-26—Louisville, Annual Automobile Show, Louisville Automobile Dealers Ass'n, First Regiment Armory, C. L. Alderson, sec'y.
- Feb. 21-26—Salt Lake City, Annual Automobile Show, Intermountain Automotive Trades Ass'n, W. D. Rishal, Mgr.
- Feb. 26-Mar. 5—Buffalo, Annual Automobile Show, Buffalo Automobile Dealers Ass'n, 74th Regiment Armory, C. C. Proctor, Mgr.
- Mar. 2-10—Des Moines, Annual Automobile Show, Colliseum, C. G. Van Vliet, Mgr.
- Mar. 5-12—Brooklyn, Annual Automobile Show, Brooklyn Motor Vehicle Dealers' Ass'n, 23d Regiment Armory, George C. Lewis, chairman.
- Mar. 7-12—Syracuse, N. Y., Annual Automobile Show, Syracuse Automobile Dealers Ass'n, Armory, Howard H. Smith, Mgr.
- Mar. 7-12—Indianapolis, Annual Automobile Show, Indianapolis Automotive Trade Ass'n, Automobile Bldg., State Fair Grounds, John Orman, Mgr.
- Mar. 12-19—Boston, Annual Automobile Show, Mechanics Bldg. and South Armory.
- Mar. 14-19—Omaha, Annual Automobile Show, Omaha Automobile Trade Ass'n, Inc., Omaha Auditorium, C. G. Powell, Mgr.
- April 4-9—Seattle, Annual Automobile Show, Seattle Motor Car Dealers' Ass'n, Arena Hippodrome.
- April—Chattanooga, Tenn., Spring Automobile Show, Chattanooga Automotive Trade Ass'n, Sunday Tabernacle, C. A. Noone, sec'y.

FOREIGN SHOWS

- Jan. 7—Sydney, Australian Motor Show.
- Jan. 22-29—Colombo, Ceylon Motor Show.
- Feb. 7—Delhi, India, Delhi Motor Show.
- Mar. 23-28—Witwatersrand Agricultural Show including machinery and motors sections.

CONVENTIONS

- Jan. 7—New York, Advertising Managers Council, Motor & Accessory Manufacturers' Ass'n.
- Jan. 11-13—S. A. E. Annual Meeting, New York City.
- Feb. 2-4—Chicago, First Annual Meeting, Automotive Electric Service Assn. Hotel La Salle.
- May 4-7—Cleveland, National Foreign Trade Council.
- Oct. 12-14, 1921—Chicago, Twenty-Eighth Annual Convention National Implement & Vehicle Ass'n.

To Show Automobiles in Mexican Capital

NEW ORLEANS, Dec. 24—Announcements received here from Mexico City state that an automobile show will be held in the capital of the Southern republic in March, 1921. The American Chamber of Commerce, in Mexico City, originated the idea, and is the main factor in carrying it out. From present indications the show will be devoted more to the interests of the manufacturers having representatives in Mexico than to the dealers of that country, most of whom are Americans or Frenchmen. The show is to be held in the new \$25,000,000 opera house, if that building is completed in time for the opening. The show is also intended to be of assistance to the nation-wide road-building program recently outlined by the new Mexican government, by which it is proposed to connect the capital of each of the twenty-seven states and three territories with every other capital, and with Mexico City, as well as with all the ports of the country.

AUSTRALIAN RULING CHANGED

NEW YORK, Dec. 27—The Commissioner in this city of the Commonwealth of Australia announces that under a court decision over-ruling the stand of the Department of Trade and Customs, importations into Australia from all countries will be dealt with in future, for duty purposes, on a basis of the bank

rate of exchange current at date of shipment. Thus, for duty purposes, invoice values of goods shipped from the United States will not be converted at the previous fixed rate of \$4.86 to the pound sterling.

ERICSSON BANKRUPTCY DENIED

BUFFALO, Dec. 29—Denial that the Ericsson Mfg. Co. is bankrupt, as alleged in an involuntary petition filed against it by three small creditors, was contained in an answer filed in the name of the receivers, William D. Hickey and D. H. Donaldson. Trial by jury of the insolvency charge is demanded. Similar answers also were filed by the H. A. Wilson Co. of New York and the Norma Co., whose claims aggregate \$50,000. The merchandise creditors' committee had demanded that the receivers combat the insolvency allegation which they had not been inclined to do.

GILLETTE RUBBER REORGANIZES

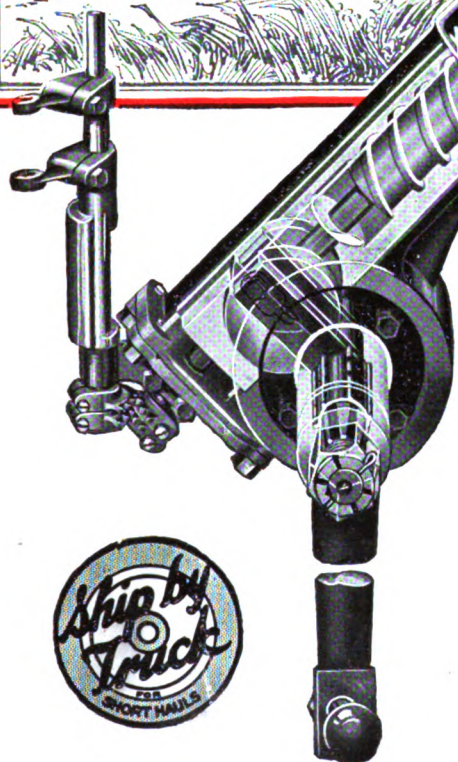
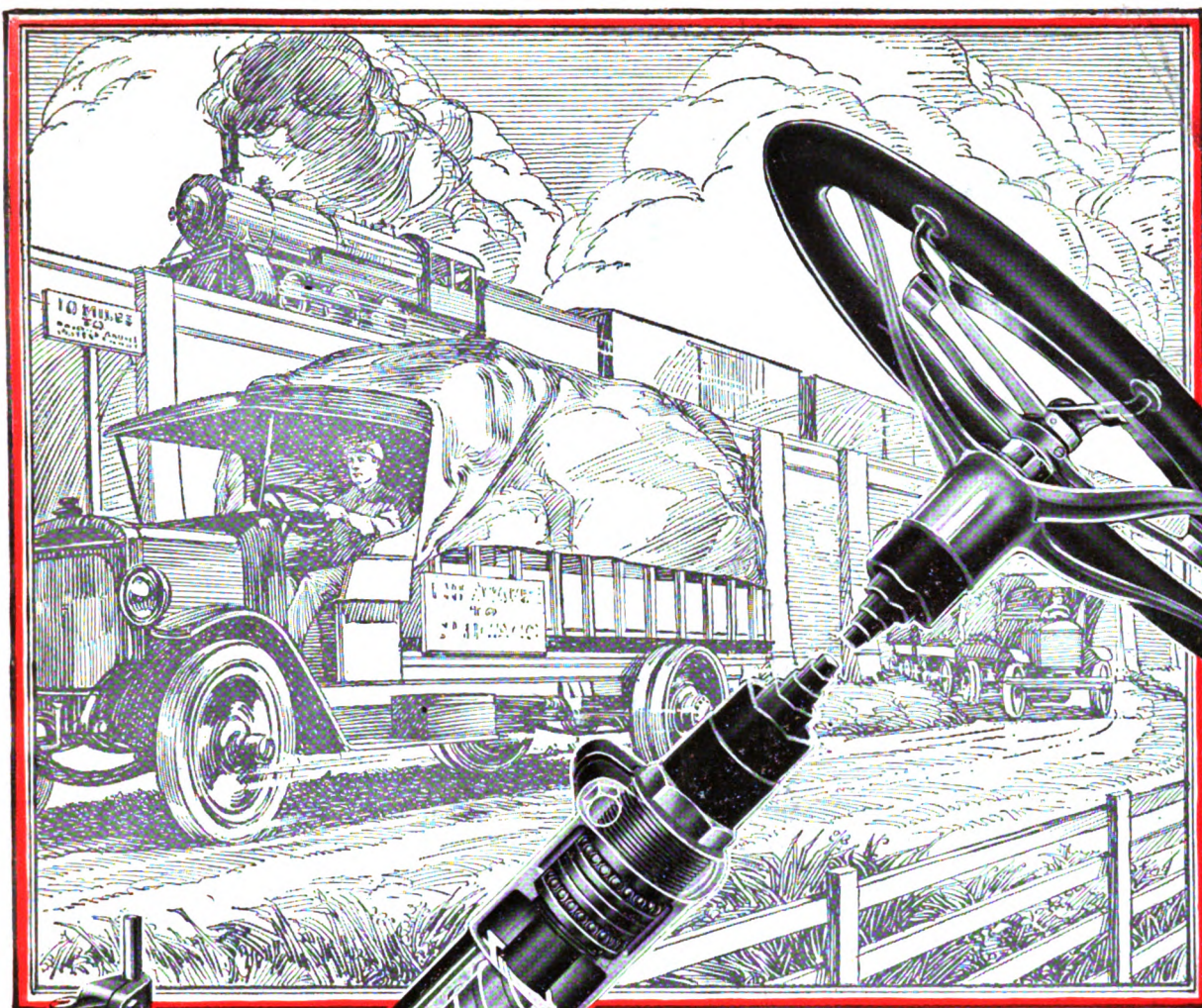
MILWAUKEE, Dec. 27—The Gillette Rubber Co. of Eau Claire, Wis., originally incorporated under the laws of Maine, has filed articles in Wisconsin. The reincorporation is part of a general reorganization plan being carried out by the present stockholders in co-operation with a committee of bankers and other creditors who are in charge of the financial affairs until April 5, 1921. S. P. Woodard of New York is president, and R. B. Gillette of Eau Claire is vice-president and general manager.

Syracuse to Start Transportation Course

SYRACUSE, N. Y., Dec. 27—Recognizing the importance of highway building problems caused by the tremendous increase in motor transportation, Syracuse University has created in the College of Business Administration a Department of Transportation in which much attention is being paid to motor transportation. This department has been endowed by H. H. Franklin, president of the H. H. Franklin Motor Car Co.

The course is being conducted by Dr. Chas. L. Raper, professor of transportation. He is developing the course from the broadest business point of view as well as along the lines of government aid and regulation. Problems of maintenance and depreciation, loading and speed, competition of the motor car and the horse-drawn vehicle, the street car and the steam railway are considered. Another phase taken up is the relation of the motor car to the building and maintenance of streets and highways.

The course has been worked out along practical lines. The student must know how to operate and care for a car before he is permitted to take the course. He must make a careful study of some practical problem of motor transportation in his own county. Several such studies of motor car problems now are being made in New York cities and rural communities. Similar problems in other States also are being considered.



Better Transportation ~The Nation's Vital Need

With rail facilities taxed to the breaking point, our biggest problem today is to relieve this strain and help transportation keep pace with industry and agriculture. Unquestionably the solution is the motor truck. Its worth has already been established, and the necessity for its use on a larger scale is becoming more and more apparent every day.

Ross Steering Gears have played an important part in making the motor truck a more efficient and reliable means of transportation. The easy steering, safety and reliability, which are guaranteed by the exclusive screw and nut design, have made Ross Steering Gears standard equipment on 418 different motor truck models from 165 different manufacturers.

Write for any further information desired

ROSS GEAR & TOOL COMPANY

700 Heath Street, Lafayette, Ind., U. S. A.

ROSS STEERING GEARS

THE STEERING GEARS THAT PREDOMINATE ON MOTOR TRUCKS



*Every Long Cooling System is scientifically adapted
to the Engine which it serves, thereby assuring
maximum cooling efficiency*

IN THE Automotive Industry the reputation and position of Long Cooling Systems are securely established. Mere mention of Long suggests that indefinable something—everything—that spells completeness, dependability and success in radiation.

No engine is more efficient than its cooling system.

Every engine aided by the Long Cooling System may operate to its utmost capacity free from radiation troubles.

LONG MANUFACTURING CO., DETROIT, MICHIGAN

Pioneer Makers of Cooling Systems for Gasoline Engines

LONG
COOLING SYSTEMS

The Recognized Standard for Tractor, Trucks and Motor Cars.

AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

Vol. XLIII
Number 20

PUBLISHED WEEKLY AT 239 WEST 39th STREET
NEW YORK, NOVEMBER 11, 1920

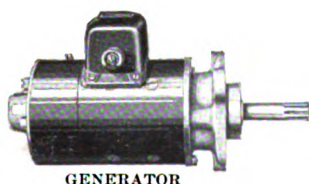
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NOV 18 '20

ATWATER KENT

Ignition, Starting and Lighting

equipment is essentially a System De Luxe. In excellence and dependability of performance it conforms to the most exacting requirements of America's foremost automotive engineers.



GENERATOR



COIL

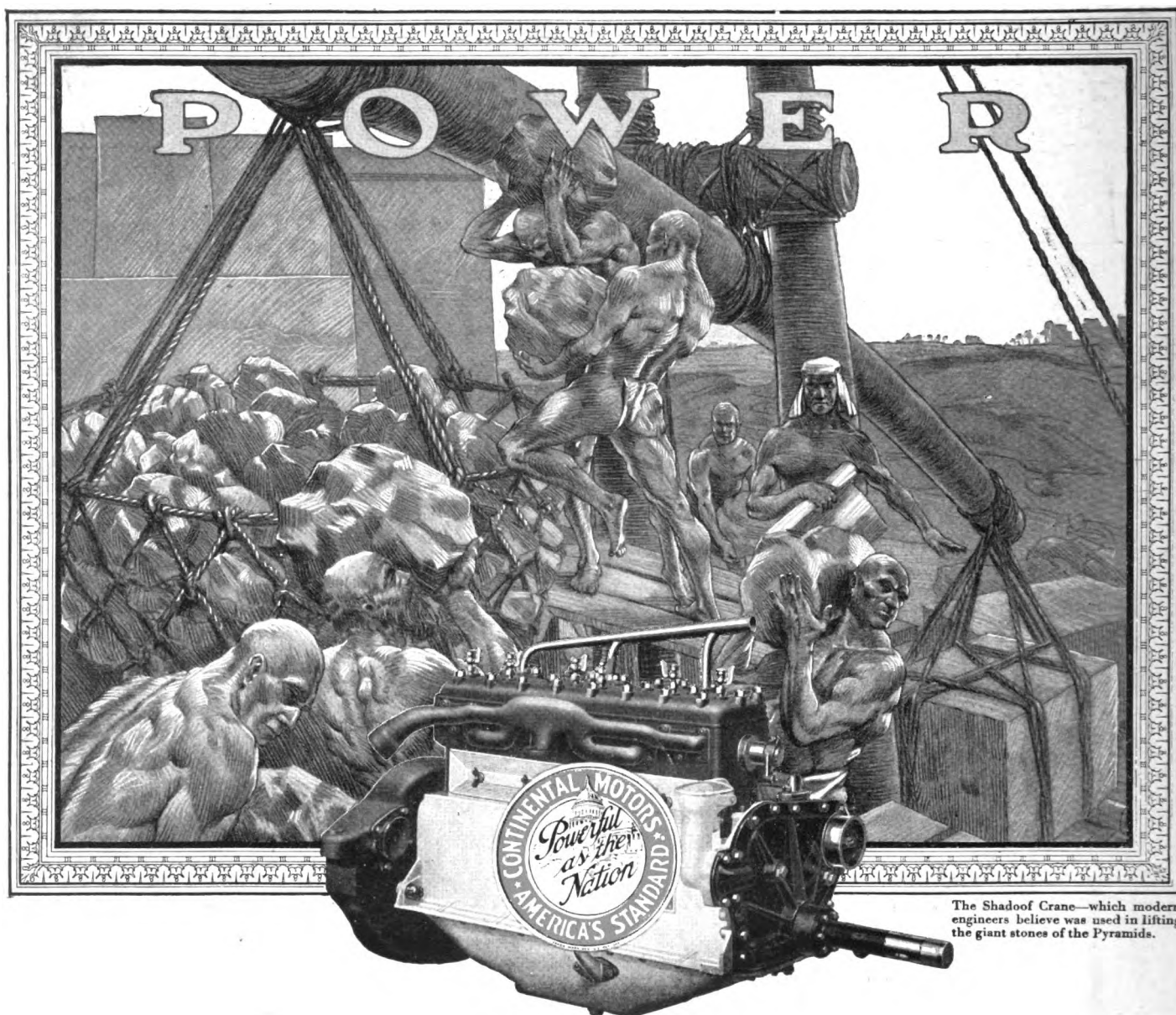
UNISPARKER



STARTER

ATWATER KENT MFG. COMPANY
Philadelphia

auto mfg 1/4 10
x 1/4 10 1/2



The vision that was responsible for the development of those basic mechanical principles has, in a sense, been inherited by the motor builder who makes use of these principles today. ¶ For where Continental Motors are produced, the vision of the directing minds of the

organization encompasses the automotive needs of the future as well as those of the moment. And it is this foresight that insures to the motor world the CONTINUED elevation of the already high standards that are represented by the Continental Red Seal.

CONTINENTAL MOTORS CORPORATION

Offices: Detroit, U. S. A.

Factories: Detroit and Muskegon

Largest Exclusive Motor Manufacturers in the World

Continental Motors

STANDARD POWER FOR TRUCKS, AUTOMOBILES AND TRACTORS

AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

Vol. XLIII
Number 21

PUBLISHED WEEKLY AT 239 WEST 39th STREET
NEW YORK, NOVEMBER 18, 1920

Thirty-five cents a copy
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Facts and Figures

NOT so many years ago spark plug design was largely a matter of guess work or cut-and-try.

Today even the slightest detail of design is founded on facts and figures definitely established by endless experiment.

In Champion Spark Plugs, experience, experiment and constant study have fixed facts and figures making possible the definite "Safety Factor" which is today built into all Champion Spark Plugs.

Champion Spark Plug Company
Toledo, Ohio

Champion Spark Plug Company, of Canada, Limited, Windsor, Ontario



A 43, $\frac{7}{8}$, 18 Price \$1.00

TOWN	Circulation Daily	Circulation Sunday	TOWN	Circulation Daily	Circulation Sunday
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INDIANA—Continued		Auburn		50		62	
Spencer		22		Auburn	3		12
Star City	7			Austinville	1		
State Line		1		Avery	4		8
Steubenville	1			Avoca	1		18
Stearville	6			Aysaire	1		
Stillwell	6	20		Bagley	1		
Stockwell	1			Bailey	0		
Stroh	3			Baldwin	0		
Stulvas	3	131		Bancroft	28		10
Suman				Barnes City			
Summitville		14		Bassett	2		
Swanington	1			Bataavia	25		16
Swazey				Bate Creek	2		
Syracuse	73	70		Baxter	2		
Tab				Bayard	2		
Talbot				Beach	1		
Tegarden		1		Beacon	1		
Tert	10			Beacondale	1		
Templeton		22		Beaman	19		17
Terre Haute	227	1,893		Bedford	69		62
Thayer	2			Bell	1		
Thorntown	2			Belleplaine	120		167
Tioso	2			Bellvue	21		50
Tipton	2	60		Belmont	22		42
Tippecanoe	2			Berna	12		
Topoka	43			Bernard	0		
Tunnelton	1			Bettendorf	0		
Twelve Mile	3			Bidwell	10		
Union Center	3			Birmingham	17		16
Union City	3	56		Bishop	1		
Uniondale				Blairburg	6		
Union Mills	40			Blairtown	20		22
Upland	2	10		Blackton	2		13
Urbana	2			Bloomfield	64		61
Valentine	1			Bode	0		
Valparaiso	461	735		Bondar	20		
Van Buren	4			Bonsar	24		8
Vanderburg	39			Boonville	196		881
Vincennes	161	712		Boone	2		
Viola	1			Boyd	0		
Wabash	121	291		Bradley	2		10
Wadena	1			Bradford	1		
Wakarusa	17	14		Bradgate	2		
Walkerton	48	80		Brandon	0		
Walton	35	24		Breda	1		
Wasatch	7			Brewer	1		
Warren	7			Bricelyn	1		
Warsaw	237	455		Bridgewater	6		
Washington	19	61		Brighton	56		62
Waterloo	2			Briar	1		
Waveland	2			Britt	83		90
Wawaka	2			Brooks	1		
Wawasee	1			Bronson	83		
Wellsville	1			Brooklyn	7		8
Wellsville	1			Brooks	7		8
West Baden	33	110		Bryant	0		
West Lafayette	14			Buckingham	0		
West Lebanon	1			Buckley	0		
West Point	1			Buffalo	0		50
Westville	46	30		Buffalo Center	12		2
Wheatfield	22			Buckeye	1		
Wheeler	8	25		Buckeye	1		
Whiteland	1			Burlington	492		1,607
Whiting	200	870		Burnside	1		
Williamsport	21	74		Burt	16		0
Winchester	8			Butler	1		
Winchester	1			Calamus	16		17

"THE CHICAGO TRIBUNE D



A big national advertiser recently signed a contract for one hundred and twenty-six thousand dollars (\$126,000) worth of rotogravure advertising to run within one year in The Chicago Tribune. He is sure that the results will repay him because he knows what a powerful influence The Chicago Tribune wields throughout the five great states above—Illinois, Indiana, Iowa, Michigan and Wisconsin.

At the left is reproduced a fragment torn from The Chicago Tribune's 1920 BOOK OF FACTS. Sixty columns such as here shown are required to list the circulation of The Tribune, which gives some conception of the density with which it covers this territory.

Wealth of The Chicago Tribune's Market

The five states of the Chicago territory occupy one-eleventh of the area of the United States, but in this area dwell one-sixth of all of our population. And this one-sixth of the population possess one-fifth of the national wealth. The wise executive will insist that one-fifth of his advertising appropriation and of his sales effort will be concentrated in this rich productive territory.

Just now an unique advertising buy is open to a few national advertisers in the opportunity to secure color pages for 1921 in the Blue Ribbon Fiction Section of The Chicago Sunday Tribune.

The Chicago Tribune

THE WORLD'S GREATEST NEWSPAPER

Write for The Tribune's 1920 BOOK OF FACTS, one among many features being the complete tabulation of Tribune circulation, two columns of which are here reproduced.

AUTOMOTIVE INDUSTRIES

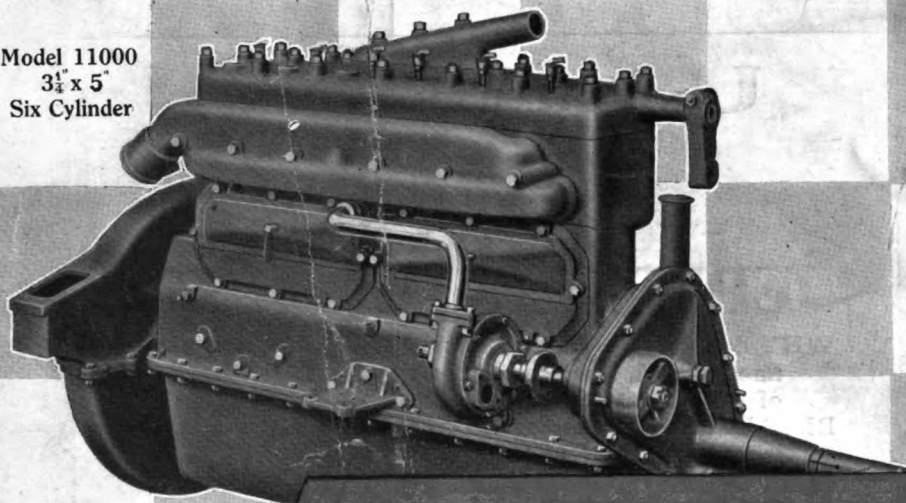
The AUTOMOBILE

Vol. XLIII
Number 22

PUBLISHED WEEKLY AT 239 WEST 39th STREET
NEW YORK, NOVEMBER 25, 1920

Thirty-five cents a copy
Three dollars a year

Model 11000
3½ x 5"
Six Cylinder



THEIR unquestioned efficiency during long service is traceable to that inherent quality of quick responsiveness, flexible control, steady pull, unwavering persistency of action—factors of reliance found only in the best engines.

Two Models, No. 7000—3½ x 5 four cylinders and No. 11,000—3½ x 5 six cylinders.

**HERSCHELL-SPILLMAN
MOTOR CO.**

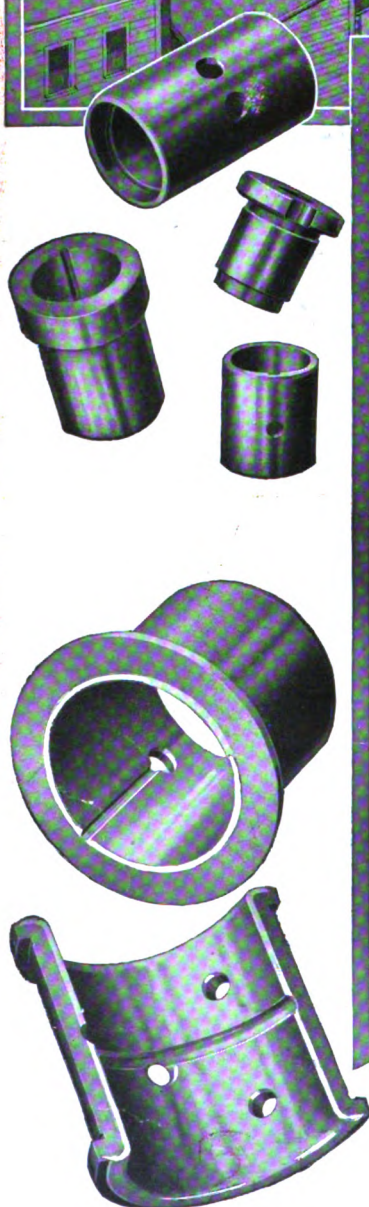
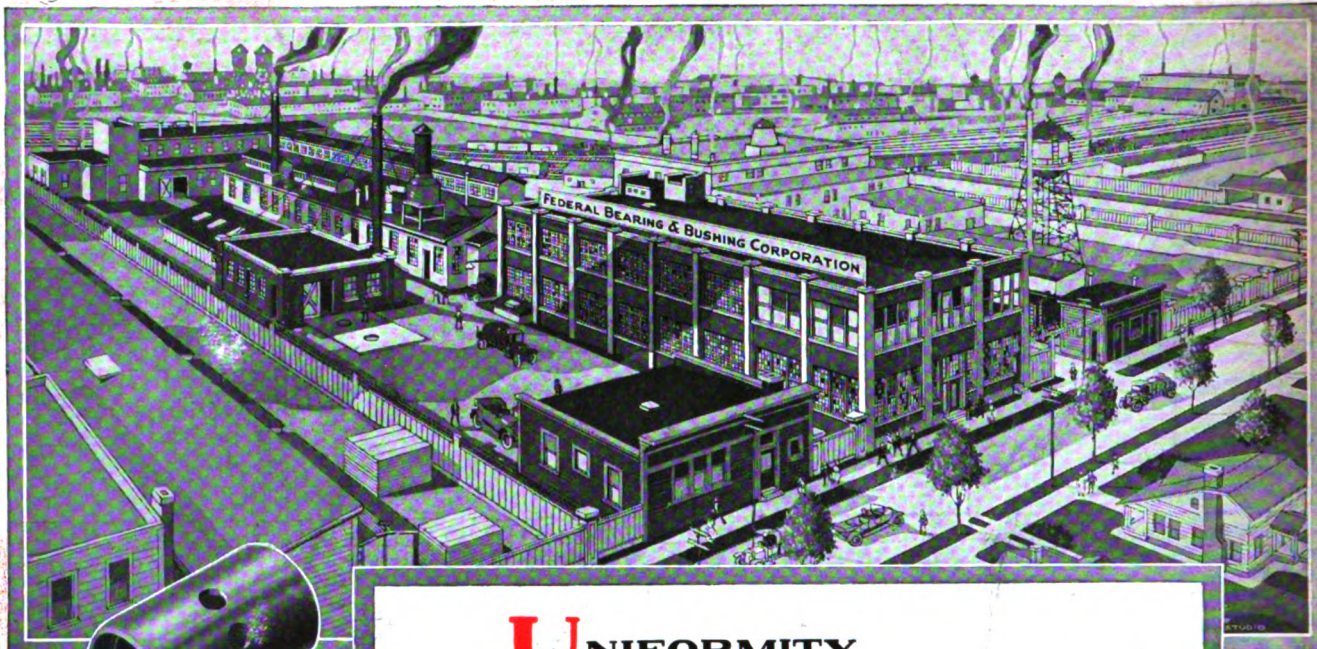
Established 1900

NORTH TONAWANDA, N. Y.



"The Pick

of the Field"



UNIFORMITY
SOLIDITY
EXCELLENCE

FEDERAL BEARINGS

WHY does every Federal Bearing show the same tough, fine grained, homogeneous structure in the fracture of the Babbitt lining?

BECAUSE every Bearing is chilled immediately after it is lined. That is UNIFORMITY.

WHY is every Federal Bearing guaranteed absolutely free from porosity?

BECAUSE the process of manufacture makes it impossible for the Babbitt to contain air while cooling. That is SOLIDITY.

WHY is every Federal Bearing manufactured from the highest grade materials, machined accurately and subjected to the most rigid inspection?

BECAUSE "FEDERAL DETROIT" must be stamped on the back. That is EXCELLENCE.

What Is Our Secret?

CENTRIFUGAL FORCE

(Process Protected by Patents)

THINK



FEDERAL BEARING & BUSHING CORPORATION
BABBITT-LINED BRONZE-BACK BEARINGS - BRONZE BUSHINGS - BRONZE CASTINGS
DETROIT - MICHIGAN

AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

Vol. XLIII
Number 23

PUBLISHED WEEKLY AT 239 WEST 39th STREET
NEW YORK, DECEMBER 2, 1920

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Three dollars a year

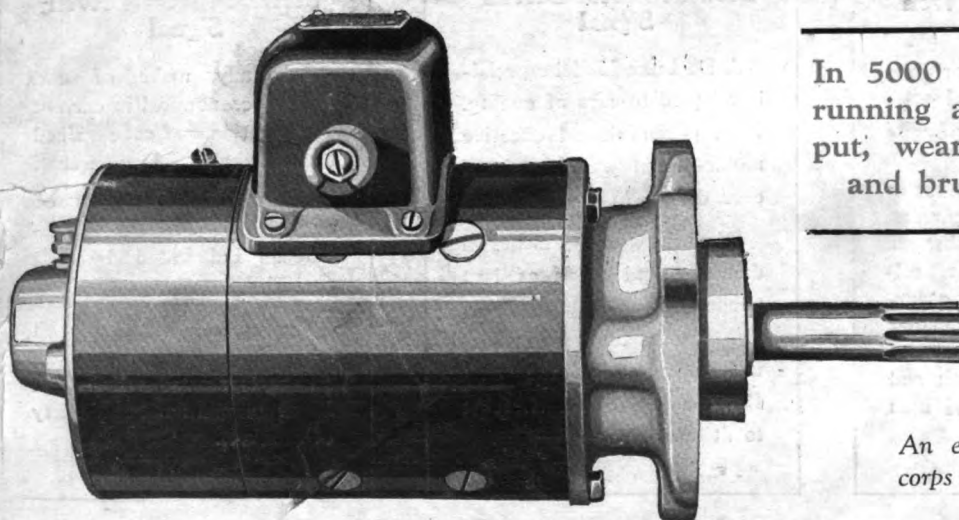
ATWATER KENT

Ignition, Starting and Lighting

THE ATWATER KENT GENERATOR

High efficiency.
Extremely low cut-in speed.
Very high generator output at low speed.
Continuous maximum output at safe
temperatures.
Smooth running and quiet.

Die cast aluminum heads reduce weight.
Greater brush accessibility.
Liberal mechanical proportions and
clearances.
Rugged and durable, no delicate adjust-
ments or parts.



In 5000 hours continuous
running at maximum out-
put, wear on commutator
and brushes negligible.

An expert engineering
corps is at your service.

ATWATER KENT MFG. COMPANY *Philadelphia*

Of Interest to Every Car Manufacturer

Model 136 Stewart Electric Signal is considered to be the real warning signal for standard equipment.

Radical changes in our manufacturing methods will greatly reduce manufacturing costs. Its tremendous popularity will increase quantity production to a large extent.

It will be possible, quality considered, to offer this signal at a price to conform with every car



maker's requirements. Its characteristic excellence will be retained. It will meet the approval of every car factory engineer.

Car manufacturers about to give consideration to 1921 electric horn equipment will find it advantageous to reserve decision until visited by our representative.

**Stewart-Warner Speedometer
Corp'n**

Chicago, U. S. A.

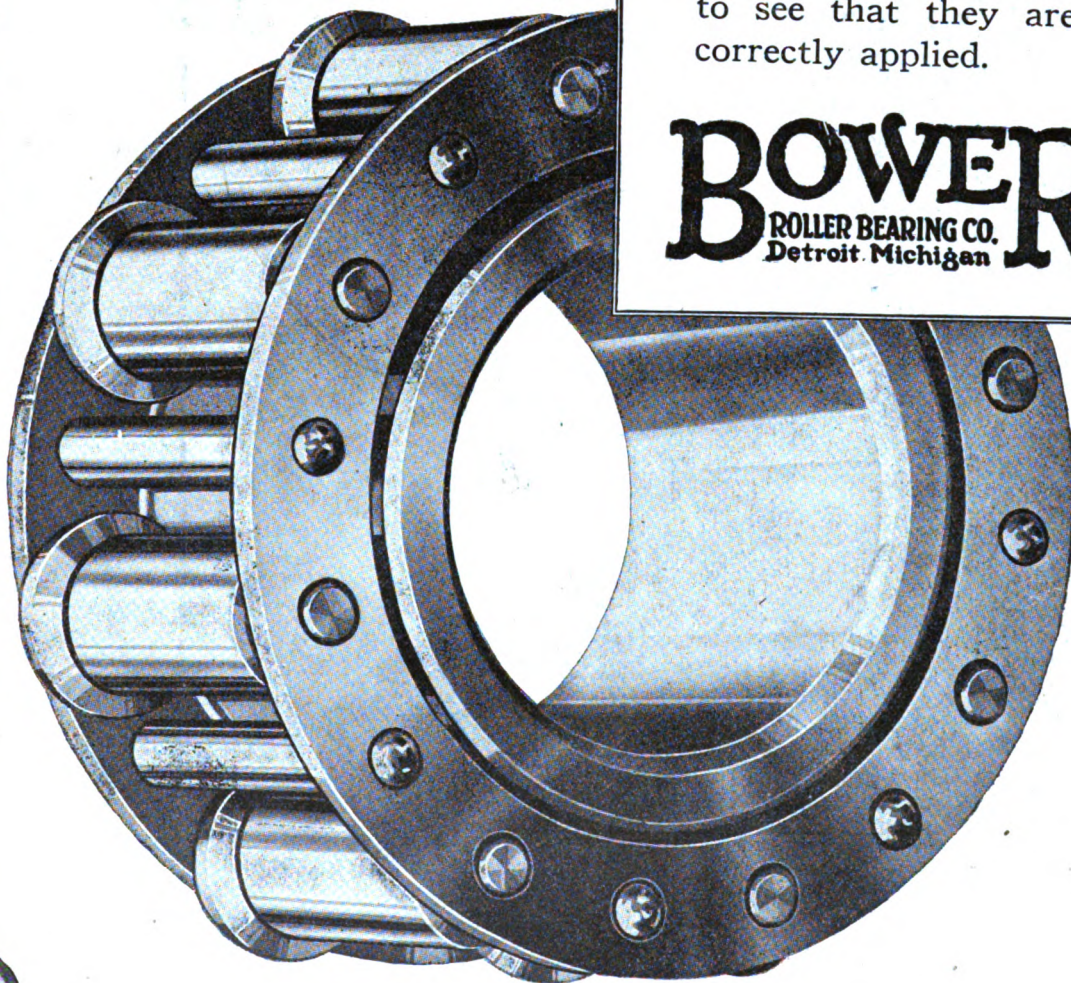
CARRIES THE LOAD

TAKES THE THRUST

BOWER Bearings
are made in sizes
to fill every conceivable
need.

We maintain an en-
gineering department
to see that they are
correctly applied.

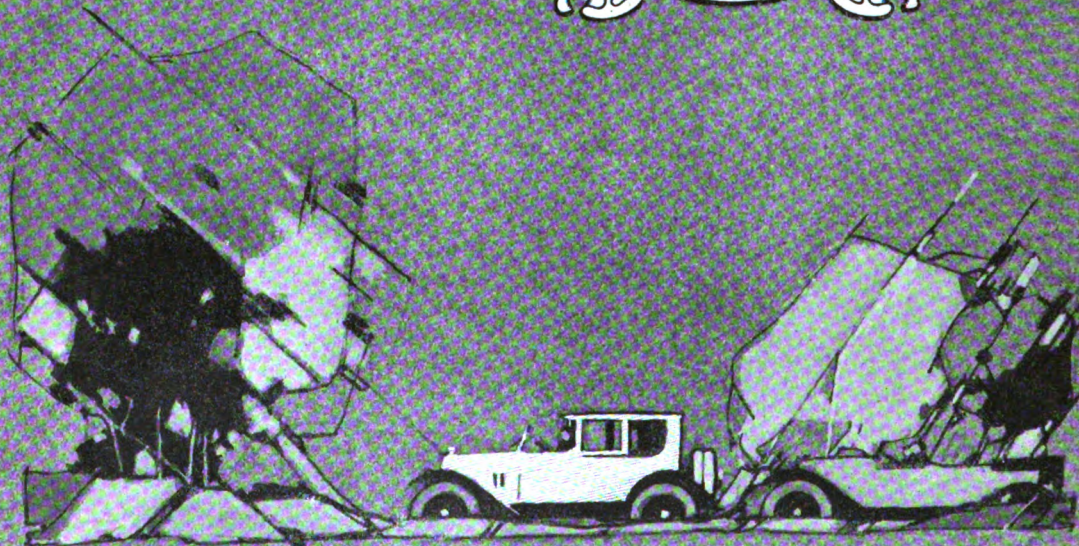
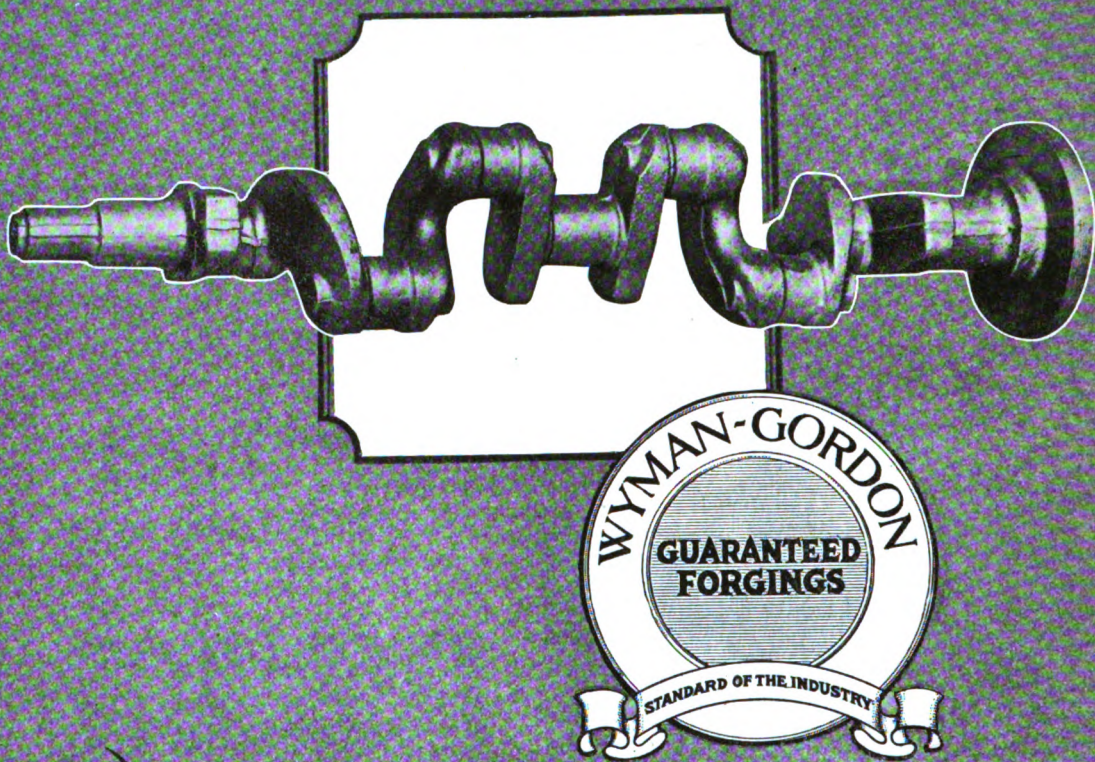
BOWER
ROLLER BEARING CO.
Detroit, Michigan



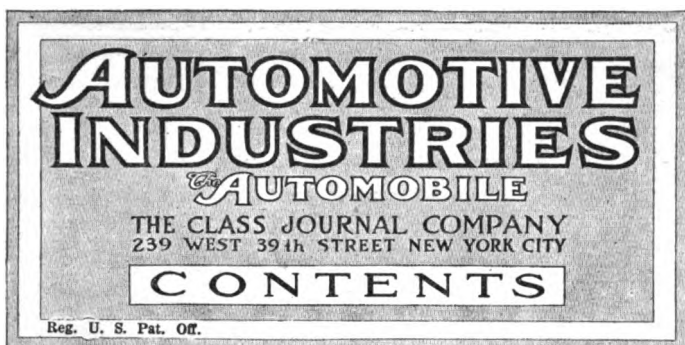
Exclusive Bower Features

Separate bearing surfaces for load and thrust. Parallel raceways. Self-aligning. Never need adjusting. Does not develop end thrust under loads. Will not bind or end-slip.





WYMAN-GORDON
The CRANKSHAFT MAKERS
WORCESTER, MASS. CLEVELAND, OHIO.
CHICAGO, ILL.



Vol. XLIII New York, December 30, 1920. No. 27

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More Results of Tractor Tests at Nebraska. 1306

Substitute Metals in Automobile Construction 1309

Two Types of Airships Used by French Government. By John Jay Ide..... 1310

Refinement, Style and Comfort Aim in New Body Designs. By George O. Mercer.... 1312

An Engine With Variable Clearance Volume and Valve Timing 1314

Machine for Milling Off Crankshaft and Camshaft Ends 1316

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"NORMA"

PRECISION BALL BEARINGS

(PATENTED)

In maintaining the lowest cost per mile or per hour of dependable service, dependable ignition and lighting apparatus is no small factor. The cars, trucks, tractors and power boats which most consistently approach this desirable minimum are—in the great majority of cases—those equipped with ignition apparatus and lighting generators in which **"NORMA"** Precision Bearings are standard.

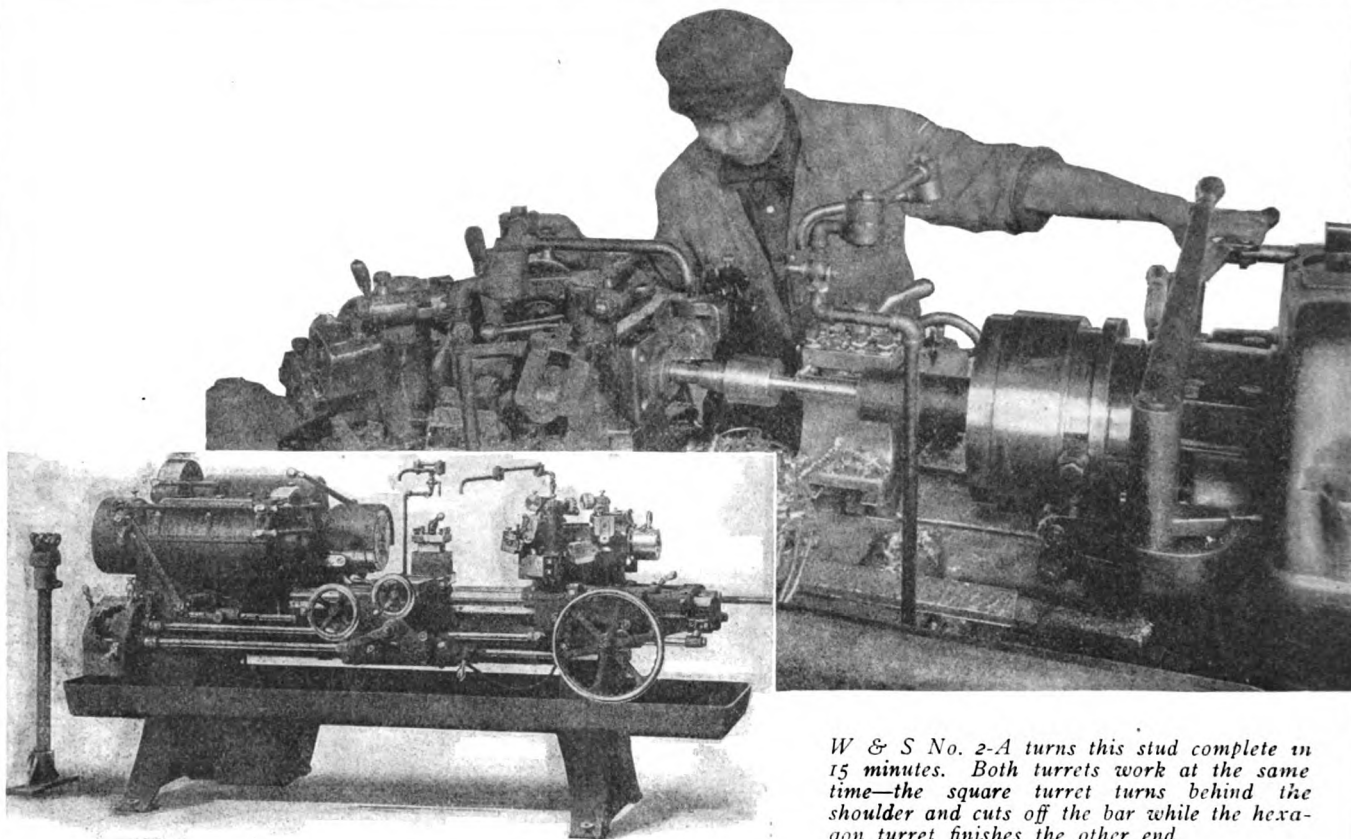
See that your electrical apparatus is **"NORMA"** equipped.

THE NORMA COMPANY OF AMERICA

Anable Avenue
 Long Island City
 New York



Ball, Roller, Thrust and Combination Bearings



W & S No. 2-A turns this stud complete in 15 minutes. Both turrets work at the same time—the square turret turns behind the shoulder and cuts off the bar while the hexagon turret finishes the other end.

Everyone Considers Price

Of course everyone considers price. And a thing is expensive or not in proportion to its value to you.

When a machine is built in such a way that it delivers service to you year after year without ceasing, it's worth something.

When a machine is built in such a way that its accuracy lasts year after year, you want to know about it.

When this accurate-durable machine produces your work faster and better than any other machine on the market, your costs go down and you know your investment in that machine is a paying one.

Warner & Swasey Turret Lathes are built just that way. We'd be glad for a chance to prove it to you—Write us.

Turret Lathes from 4 1/2" x 44"—21" Swing to 5/8" x 4"—10" Swing

The Warner & Swasey Company

CLEVELAND, U. S. A.

BRANCH SALES OFFICES:

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Boston: Oliver Building.

Buffalo: Iroquois Building.

Detroit: Ford Building.

Domestic Agents:

Fulton Supply Company, Atlanta, Ga.

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Woodward, Wight & Company, New Orleans, La.

Salt Lake Hardware Company, Salt Lake City, Utah.

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Fred Ward & Son, San Francisco, Calif.

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Chicago: 618-622 Washington Boulevard.

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Foreign Agents:

Charles Churchill & Company, Ltd., London, Birmingham, Manchester, Bristol, Newcastle-on-Tyne, Glasgow.

Allied Machinery Company, Paris, Turin, Zurich, Barcelona, Brussels.

Wilhelm Sonesson Company, Malmo, Copenhagen, Stockholm, Gothenburg.

R. S. Stokvis en Zonen, Rotterdam.

Benson Brothers, Sydney, Melbourne, Adelaide.

Yamatake Company, Tokyo.

McLeod & Company, Calcutta.

Andersen, Meyer & Company, Ltd., Shanghai.

Brossard-Mopin & Company, Saigon, Singapore, Haiphong.

IT is good to stretch the muscles for a new effort after the old job has been finished. It is good to let the dead past bury the past, to drop the old mistakes and the old difficulties, taking only into the present the greater experiences which will enable us to use our strength more effectively on the new job.

The old year is gone with its excited rush for goods and its slackening of effort, with its peaks and low points. The New Year is before us and will be pretty much what we make it. We have the strength, the muscles and, I believe, the intelligence and courage to build up a year of constructive progress.

We wish you a Happy New Year—industrial happiness like social happiness comes from within—The joy of accomplishment is before us industrially. Together we can secure it.

Harry Tipper

IN the bearings sponsored by **SKF** its type of anti-friction bearings have been developed to their highest perfection. And **SKF** further provides an engineering service not only to assure to itself proper application and use of **SKF** marked products but to help the buyer to fully capitalize the mechanical value built into each device. This service is freely offered and is being continually broadened and advanced by laboratory research that is international in scope. You are assured a similar service behind every product bearing the mark—

SKF

Among these products now offered are:

Single row deep groove ball bearings.

Double row self aligning ball bearings.

Thrust bearings.

Steel balls.

Transmission equipment.

SKF Industries Inc.
165 Broadway, New York City

Supervising at the
request of the stockholders

The Hess-Bright Manufacturing Co.

SKF Ball Bearing Co.

Atlas Ball Co.

Hubbard Machine Co.

SKF Research Laboratories



SKF Research Laboratory established at Philadelphia to co-operate with the Gothenburg Laboratories in the study of the American Manufacturers' friction problems.

Hy-Duty-Fans

for Automobiles - Trucks - Tractors

**Standard Equipment
With More Than
250 MANUFACTURERS
Perform Their Duty
of Cooling Motors
Faithfully
All Over the World**

**AUTOMOTIVE
PARTS COMPANY**
INDIANAPOLIS, U.S.A.

AT THE SHOW

Two New Machines

Style No. 55 Cylinder Grinding Machine

A self-contained grinding machine built expressly for the purpose of finishing a large variety and all sizes of work. Ideal for the regrinding of worn and scored cylinders. With its wide base and large distance between the table and the center of the grinding wheel it is highly recommended for the railroad shops and general repair work.

Device for Automatically Grinding Piston Rings

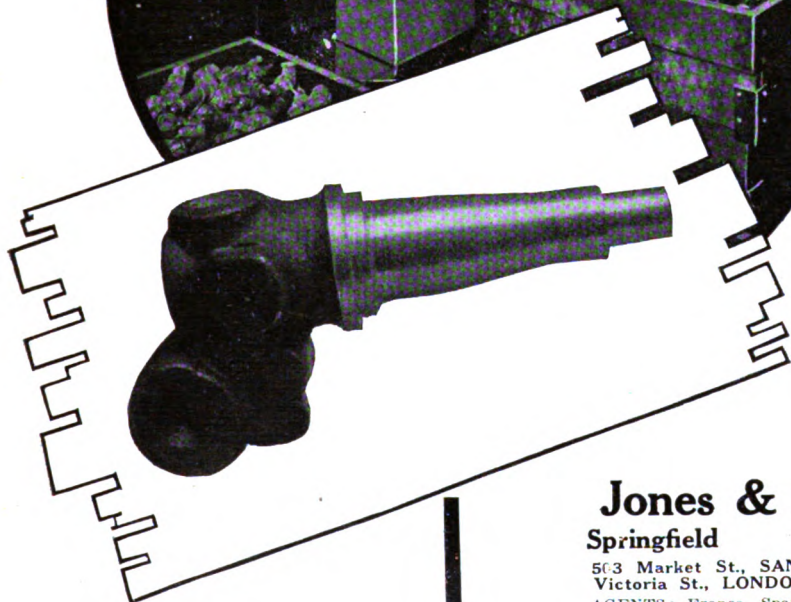
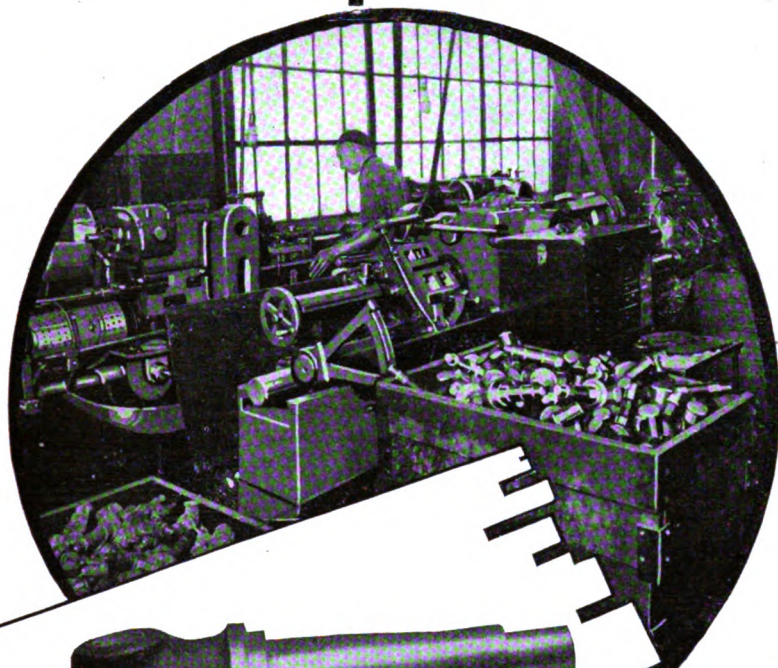
Requires only the filling of the hopper and the carrying away of the finished product in a basket. Maintains continuous maximum production without requiring skilled and experienced operator. Designed to be used with a Heald Style No. 22 Surface Grinder.

Model machines will be shown at the New York Auto Show January 8th to 15th at booths E-88 and E-89. If you cannot be there let us furnish you with information about same.

THE HEALD MACHINE CO. 11 New Bond St.
WORCESTER, MASS., U. S. A.

BRANCH OFFICES: New York, 839 Singer Bldg.; Philadelphia, 1308 Commonwealth Bldg.; Chicago, 26 South Jefferson St.; Detroit, 401 Marquette Bldg.; Cincinnati, 311 Provident Bank Bldg.; Cleveland, 721 Engineers' Bldg. WESTERN AGENTS: Eccles & Smith Co., Los Angeles, San Francisco, Seattle and Portland; Salt Lake Hardware Co., Utah and Idaho; Hendrie & Bolthoff Mfg. & Supply Co., Denver, Colo.

FAY AUTOMATIC LATHE



THE FAY Automatic Lathe is recognized as a standard machine for the handling of standardized automobile parts—pistons, hubs, gear blanks, camshafts, etc. All these parts show the same production-boosting results when turned the Fay-way that is shown on these steering knuckles, being turned out in large lots in record-breaking time at the plant of the International Harvester Company, Akron, O.

Send sample piece or blueprint of your work for time estimate.

Jones & Lamson Machine Co.

Springfield

Vermont

503 Market St., SAN FRANCISCO, CAL. 9-10 Water Lane, Queen Victoria St., LONDON, ENG.

AGENTS: France, Spain and Belgium—F. Aubert & Co., 91 Rue de Mauberge, Paris; Holland—Spliethoff, Beeuwkes & Co., Rotterdam; Japan, Korea, etc.—Mitsui & Co., Ltd., Tokio; Australasia—McPherson's Pty., Ltd., 554 Collins St., Melbourne; Stockholm, Sweden—A. Bol Oscar Lindbom, Post-box 420.

*The FAY-WAY
of Machining Steering Knuckles*

AT THE INTERNATIONAL HARVESTER CO., AKRON, OHIO

A Distinctive Product

IT is a rare case where a machine tool builder has won the distinction of being the originator of an industry devoted exclusively to one particular product.

The Gear Shaper is unique in this respect. Many of the large automobile and truck transmission manufacturers have built their business up largely on the Gear Shaper, and have been able to keep pace with the demands for a better product in larger quantities, because of the adaptability of this machine to the cutting of accurate gears in large quantities.

The machine tool builder has also greatly profited from the advantages offered by the Gear Shaper, in that he has not only been able to make his product better, but it has been possible for him to adopt various forms of so-called "special" gears that have not only simplified his product, but greatly increased its manufacturing possibilities.

In other words, the Gear Shaper has made it possible for the machine tool builder to produce a distinctive product.

The possibilities of the Gear Shaper are practically unlimited. The designer finds that this machine will not limit him in his choice of the selection of an efficient and desirable form of gear, and new examples of favorable gear applications are constantly being adopted.

If you are interested in this subject, our booklet, "Commercial Gear Cutting," will prove of value to you.


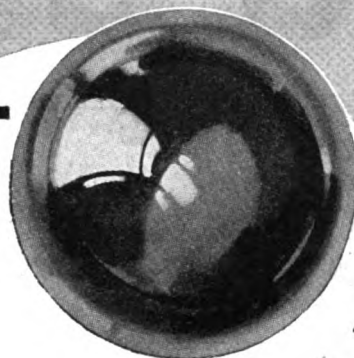
The Fellows Gear Shaper Company

Springfield, Vermont, U. S. A.

FOREIGN AGENTS: Alfred Herbert, Ltd., Coventry, England; Societe Anonyme Alfred Herbert, Paris, France; Societa Anonima Italiana Alfred Herbert, Milan, Italy; Alfred Herbert, Ltd., Yokohama, Ja-

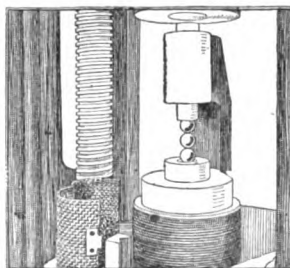
pan; Societe Anonyme Alfred Herbert, Barcelona, Spain; Societe Anonyme Belge Alfred Herbert, Brussels, Belgium; Alfred Herbert (India), Ltd., Calcutta, India.

HOOVER STEEL BALLS



WHERE frictionless and smoothly rolling motion is essential, where unexpected loads and jolts must be withstood, designing engineers are using bearings built on Hoover balls. At any speed and in all positions the highly polished balls spin with a friction-saving freedom that is source of silence and of power conservation.

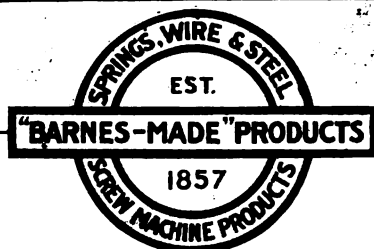
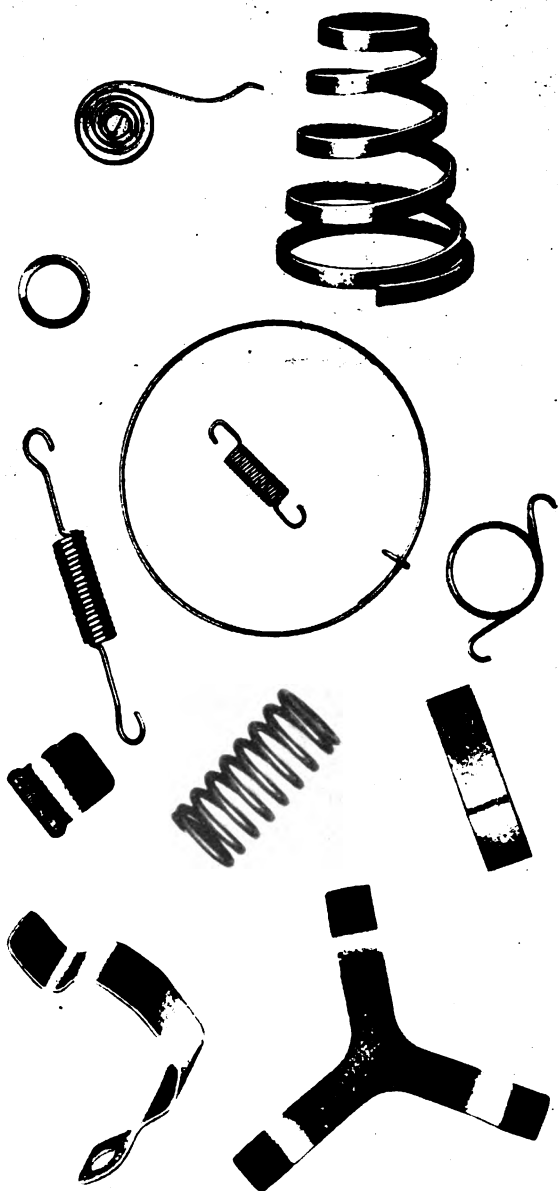
HOOVER STEEL BALL COMPANY
ANN ARBOR, MICH.



The Three Ball crushing test is a Hoover development which accurately discloses the tensile strength of any ball. It is one phase of the final super-inspection made on every lot of Hoover balls

(2)

AT THE AUTO SHOW



AT the Auto Show you are naturally watching keenly for possible new refinements in important operating parts and manufacturing methods. Some of these will very probably concern that indispensable part of every engine—Springs.

Best results will follow if you'll talk them over while they're still fresh in mind with Wallace Barnes Spring experts, who will be at the show the entire week ready to render any service or information.

Get in touch with

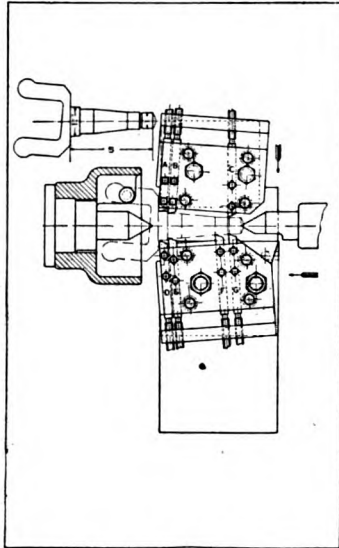
Mr. Brown Joyce
Mr. J. E. Andrew
Mr. Lyman D. Adams
Mr. William J. Black
Mr. Frank B. Tibbitts
Mr. Lisle K. Lasher

any time during Show Week at the Hotel Commodore. Just leave a message, and they will meet your convenience for appointments.

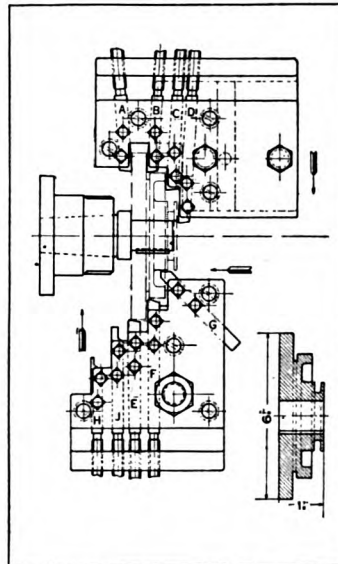
The
Wallace Barnes
Bristol, Conn. Company

REED-PRENTICE COMPANY

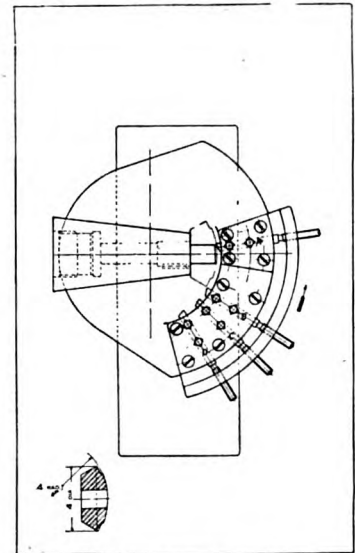
Worcester Mass. U.S.A.



Front Wheel Spindle

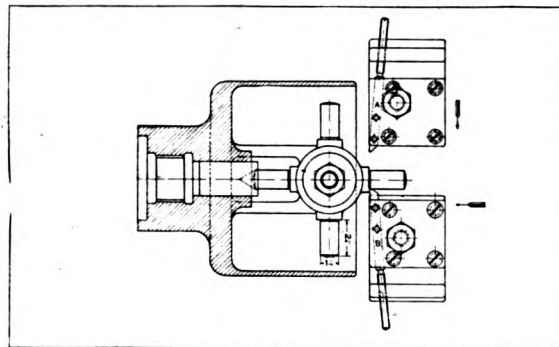


Transmission Gear



Differential Bevel Gear

A 16-PAGE PAMPHLET
EXPLAINING THIS
LATHE IN DETAIL WILL
BE GLADLY SENT ON
REQUEST.



Differential Spider

SEND US BLUE PRINTS
OR SAMPLE FORGINGS
OR CASTINGS WITH B/P
AND WE WILL BE
PLEASED TO SEND ESTI-
MATES AND TYPE OF
MACHINE BEST SUITED
FOR THE WORK.

CAN WE HELP?

HERE ARE SHOWN TOOL SET-UPS TO PERFORM THE ROUGH AND FINISH TURNING OPERATIONS ON PIECES THAT PROBABLY ARE SIMILAR TO THOSE MANUFACTURED BY YOU.

REED-PRENTICE SEMI-AUTOMATIC LATHES HAVE BEEN SOLD BY THE THOUSANDS DURING THE LAST FEW YEARS AND WE CAN, BY OUR LONG EXPERIENCE, SHOW YOU WAYS AND MEANS TO CUT THE COST OF YOUR PRODUCTION.

LET US SUBMIT TIME ESTIMATES OR DAILY PRODUCTION FIGURES THAT ARE NOT RIDICULOUS BECAUSE ONLY THE CUTTING TIME OF THE TOOL IS CONSIDERED—BUT ESTIMATES ON THE PRODUCTION OF A NORMAL HEALTHY MAN, DAY IN AND DAY OUT, USING A REED-PRENTICE.

TEST OUR SERVICE

REED-PRENTICE COMPANY

Main Office: 53 FRANKLIN ST., BOSTON, MASS.

BRANCHES:

BUFFALO Asso. Service Bldg.	CHICAGO 28 N. Clinton St.	CLEVELAND 108 Frankfort St.	DETROIT Kerr Bldg.	INDIANAPOLIS 310 Lemcke Annex	NEW YORK Grand Central Palace	PHILADELPHIA 514 Liberty Bldg.
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Chisholm-Moore

It's the Unusual that Counts

MANY tire shops spend a lot of valuable time lifting and tugging on big tires, but this up-to-date shop installed a "Cyclone" Hoist and "Matchless" Trolley and greatly increased their production—and profits.

How many places are there in your plant where a gang of men spend their time doing useless lifting and tugging?

It might be a mighty good thing for you to call one of our sales-engineers and with him go over your plant. Any suggestion he may make will be for our mutual benefit, as we realize that we can hope to win your continued orders only by rendering service and satisfaction to you.

Better drop us a line today, there's an era of stiff competition at hand, and he who gets his production UP and his costs headed DOWN is going to be the one who gets the business.

The Chisholm-Moore Mfg. Co.
Cleveland, O.

30 Church Street
NEW YORK

Henry W. Oliver Bldg.
PITTSBURGH

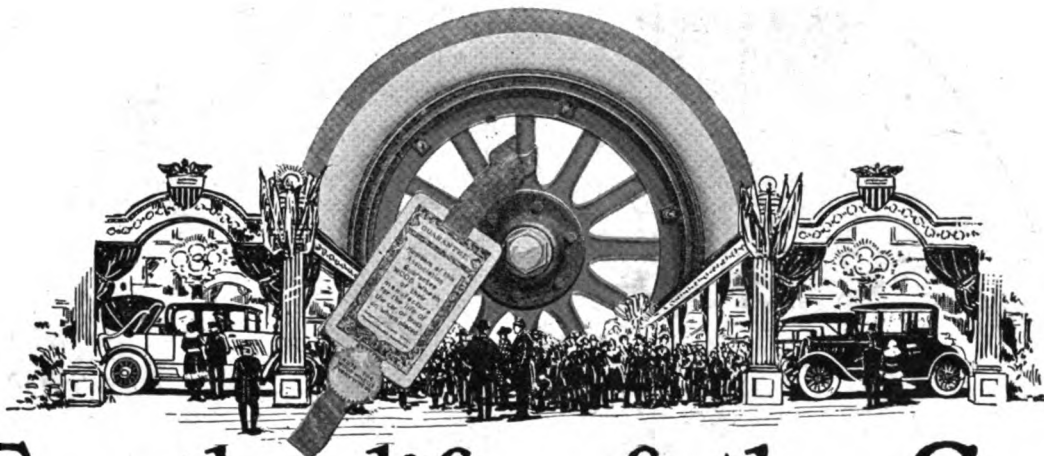
Branch Offices:

Peoples Gas Bldg.
CHICAGO

David Whitney Bldg.
DETROIT

Hoists Cranes Trolleys

NOTE THE WOOD WHEELS EVERYWHERE



For the life of the Car

Wood Wheels manufactured by the members of the Automotive Wood Wheel Manufacturers' Association are guaranteed for the life of the car on which they are placed.

This is a remarkable obligation. Wood Wheels are working units. They must withstand unnumbered road jolts and side-thrusts. Still, by the terms of this guarantee they are pledged to outlive other parts that their resiliency actually protects

from the shocks of service.

This guarantee sets forth, as nothing else could, the degree of perfection that has been attained in the construction of Automotive Wood Wheels. It expresses the faith that the makers of Wood Wheels have in their product. And it supplies a new and even greater reason why Wood Wheels will continue to be featured as standard equipment on the world's best cars.

AUTOMOTIVE WOOD WHEEL MANUFACTURERS' ASSOCIATION
175 West Monroe Street Chicago, Illinois

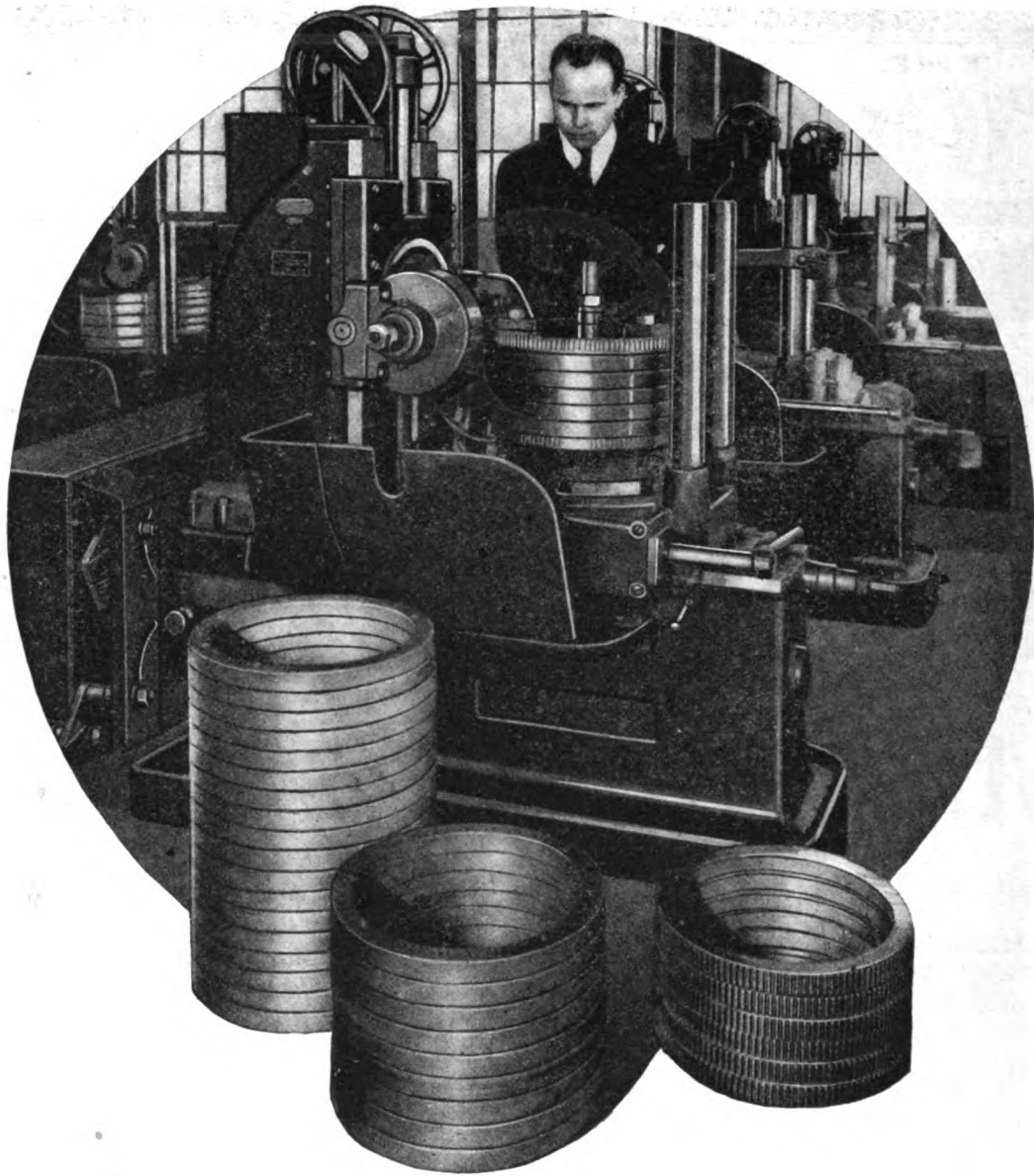
WOOD WHEELS

for MOTOR VEHICLES

For the good of the industry, the Automotive Wood Wheel Manufacturers' Association is endeavoring to achieve Hub Standardization.

Members of this Association guarantee Wood Wheels of their manufacture for the life of the car or truck on which placed.

Automotive
Wood Wheel
Manufacturers'
Association



G & E Hobbing Machines

Cutting Fly Wheels

Let Our Engineering Department Serve You

GOULD & EBERHARDT
"HIGH DUTY" SHAPERS
AUTOMATIC GEAR AND RACK CUTTING MACHINERY
ESTABLISHED 1833
NEWARK, N.J. U.S.A.

Building Pumps

With the aid of
Air Tools

LIKE most industries the modern pump making plant depends upon air tools to no small extent for economical and rapid production.

Sand Rammers are used to tamp the molds, Air Motor Hoists to handle them and Chipping Hammers and Grinders to trim and clean the castings; air drills and reamers are used extensively in the machining process; and the assembly finds air tools at work seating studs, running up nuts and performing many other operations in a most efficient manner.

Air tools will help **your** production, and you will be well repaid for investigating them. Write to the nearest branch office listed below; you will receive a service that starts with a careful study of your problems and ends only when you cease using tools.

When you write, ask for Catalog 8000

INGERSOLL-RAND COMPANY

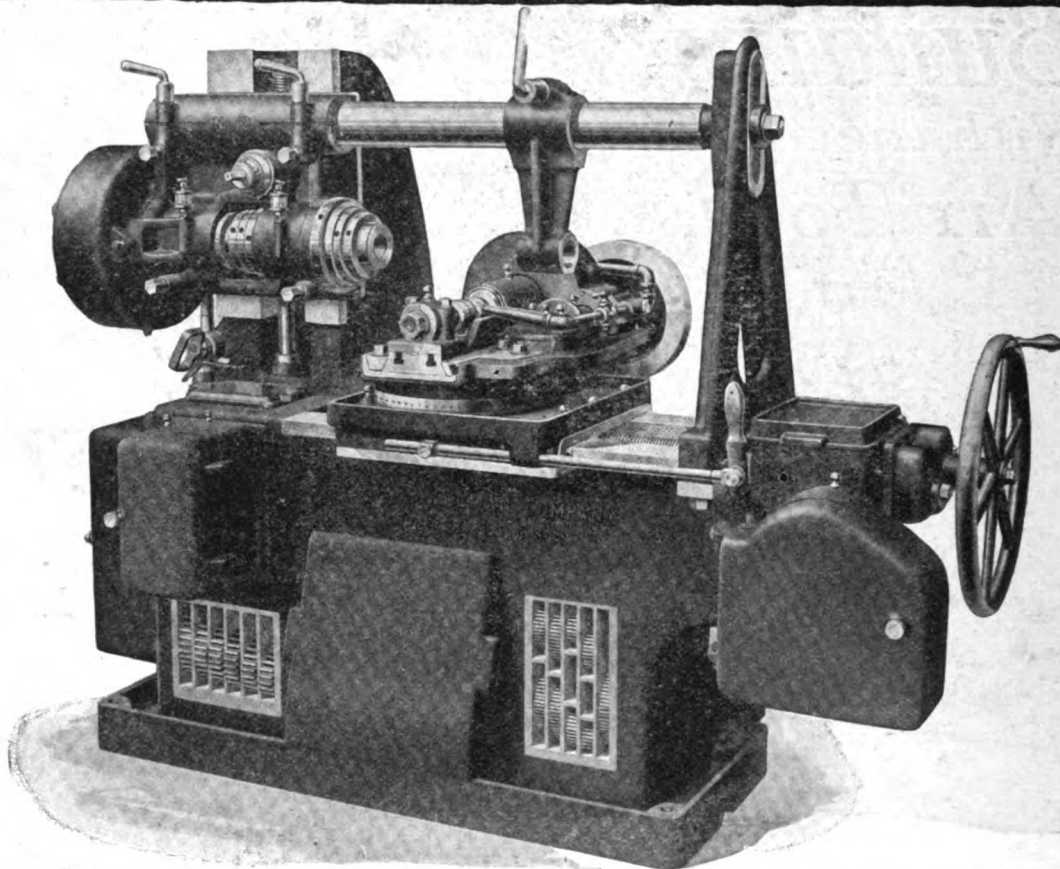
11 Broadway NEW YORK

Branch Offices the World Over

148-PT

Little David

AIR TOOLS



BARBER-COLMAN

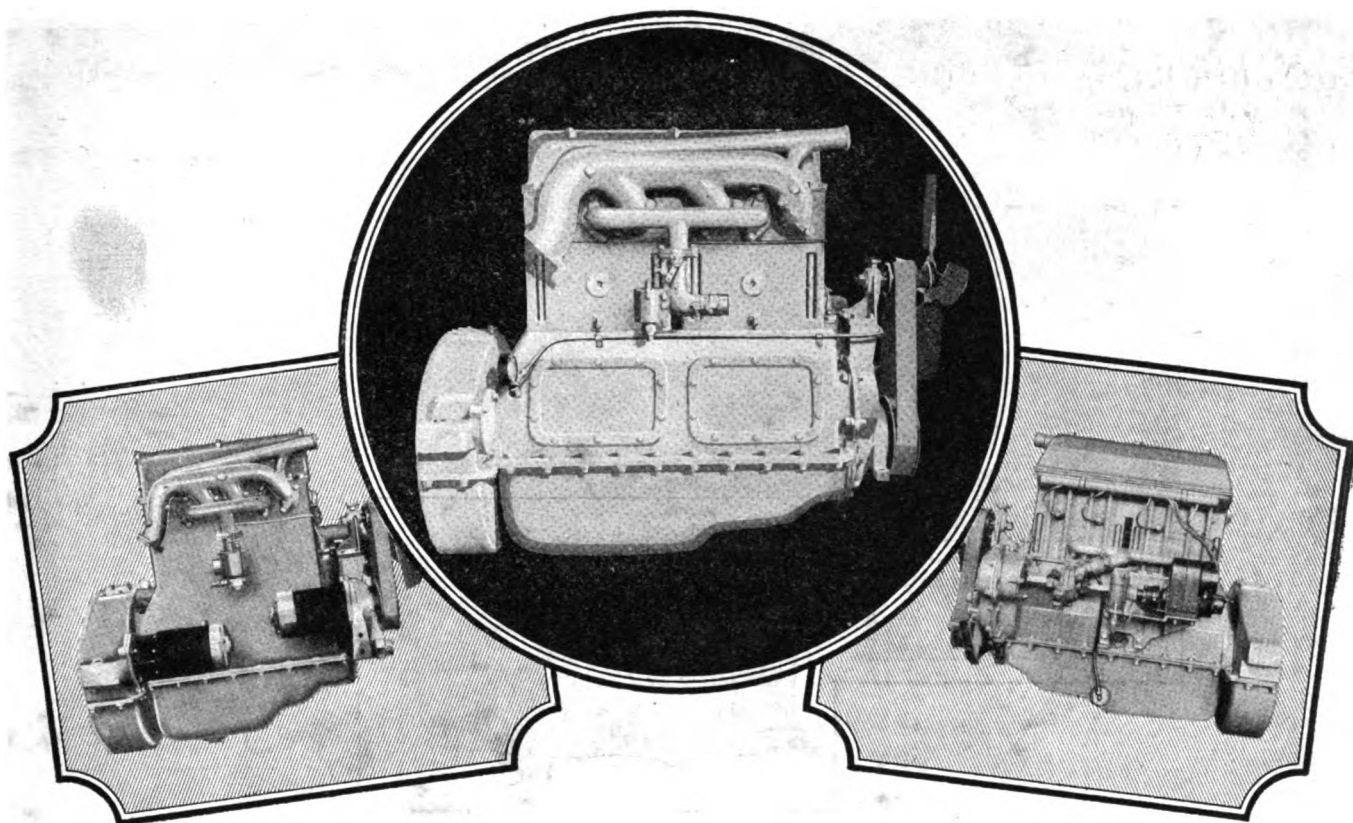
Gear Hobbing Machines

for spur and spiral gears

In continuous operation, producing accurate, quiet running gears **THE BARBER-COLMAN HOBGING MACHINE** cannot be excelled.

Spur and Spiral Gears, Spline Shafts and Sprockets of the highest degree of accuracy are also produced on our machine.

BARBER-COLMAN COMPANY
Rockford, Ill. U. S. A.

Model 408-3 $\frac{3}{8}$ x 6"Model 400-4 $\frac{1}{2}$ x 6"Model 402-4 $\frac{1}{2}$ x 5 $\frac{1}{4}$ "

Forget Bore and Stroke and Buy Engines that Sell on Performance

Study This Record of Midwest Engine Performance

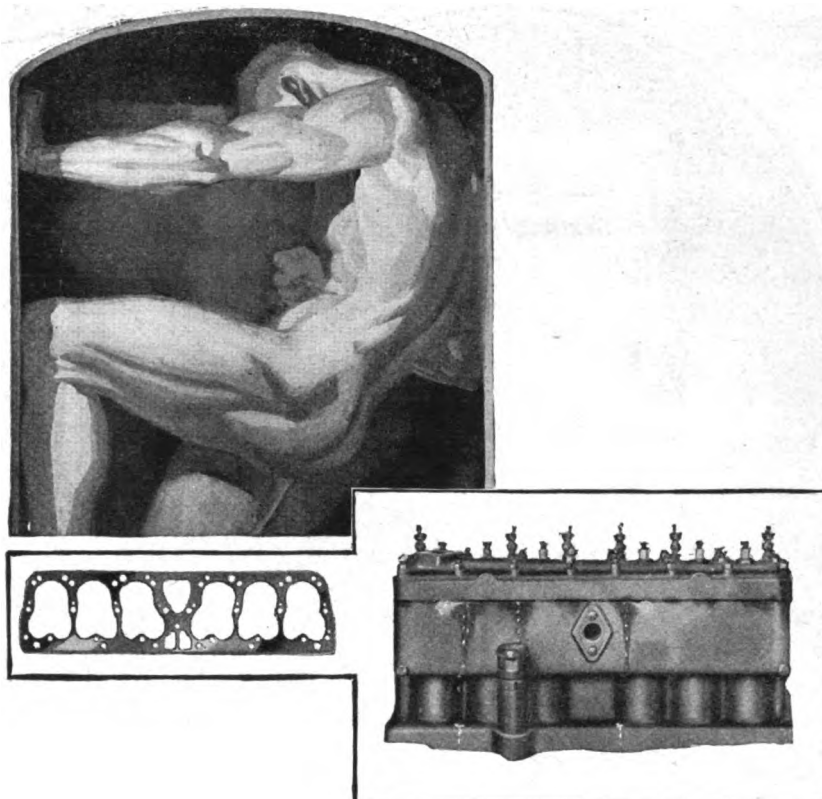
Model 408 4 Cyl. 3 $\frac{3}{8}$ x 5"			Model 400 4 Cyl. 4 $\frac{1}{2}$ x 6"			Model 402 4 Cyl. 4 $\frac{1}{8}$ x 5 $\frac{1}{4}$ "		
R.P.M.	H.P.	Torque	R.P.M.	H.P.	Torque	R.P.M.	H.P.	Torque
500	11	116 lbs. ft.	400	17.5	233 lbs. ft.	400	13	171 lbs. ft.
600	13.5	118 lbs. ft.	600	28.5	249 lbs. ft.	600	20.5	179 lbs. ft.
800	19	125 lbs. ft.	800	37.5	246 lbs. ft.	800	27.5	181 lbs. ft.
1000	25	130 lbs. ft.	1000	46	243 lbs. ft.	1000	34	179 lbs. ft.
1200	29	127.5 lbs. ft.	1200	53	234 lbs. ft.	1200	40	175 lbs. ft.
1400	33	124 lbs. ft.	1400	59	222 lbs. ft.	1400	45	169 lbs. ft.
1600	36	118 lbs. ft.	1500	61	213 lbs. ft.	---	---	---
1800	39	114 lbs. ft.	1600	---	---	1600	47.5	156 lbs. ft.
			1800	---	---	---	---	---

Note TORQUE in each case. All tests made on Standard Sprague dynamometers having 21 inch arm radius. Gasoline as fuel. Installation prints and complete specifications will be sent on request.

MIDWEST ENGINE COMPANY :: Indianapolis, U. S. A.

MIDWEST

TRUCK and TRACTOR ENGINE



Small illustration shows what happens when inferior gaskets are used.

Note to Repair Men: The best engineering authorities specify that a new gasket be used each time the motor head is removed. By doing this you insure against oil, water, and compression leaks, and add an extra profit to every job.

Victor Gaskets Hold Compression

Victor copper asbestos cylinder head gaskets withstand the terrific pressure caused by the explosion in the cylinders.

The power is confined and directed to the driving parts without loss.

Victor gaskets are accurately made of the best materials by skilled workmen to hold this compression under all conditions.

In the Victor line there are nearly 400 types of cylinder head gaskets and more than 4,000 other types.

Jobbers and dealers thus have at their command a complete assortment for every motor need.

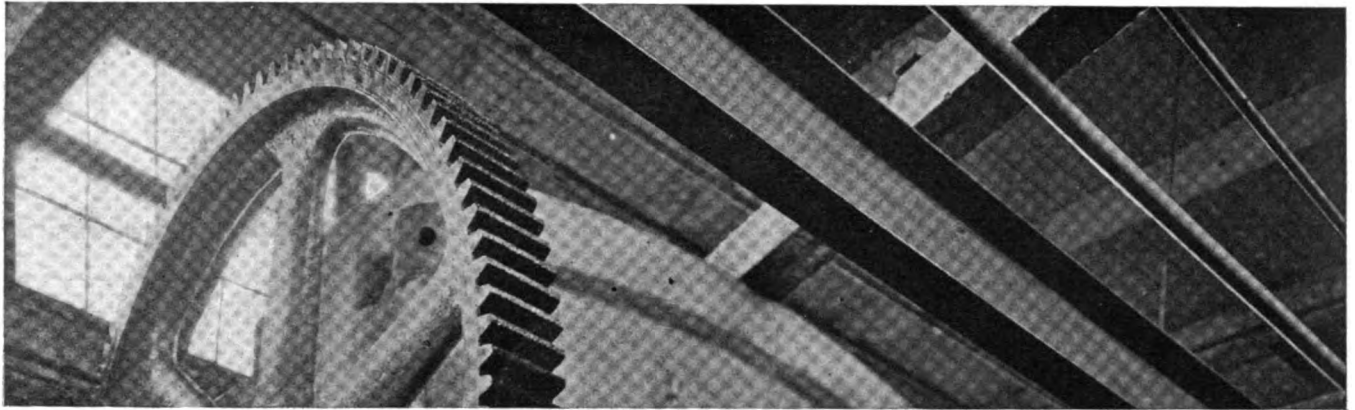
VICTOR MANUFACTURING & GASKET CO.

World's Largest Gasket Manufacturers

5750 Roosevelt Road - CHICAGO, ILLINOIS

VICTOR
COPPER-ASBESTOS
GASKETS

The World's Standard Gaskets



The Bossert Engineering Department Brings Bossert Equipment to the Very Doors of Your Own Plant

Bringing Bossert Production to you is something new in the field of co-operative endeavor.

Bossert engineers come to you with their knowledge, skill and experience—they place Bossert manufacturing facilities at your disposal. But they go further than this.

Every pressed metal job has a different phase—

a different angle. When the Bossert Man comes to your plant he brings with him an intimate knowledge of these different problems—and before he goes you can rest assured that you have received the best possible counsel.

Next time have your parts made the Bossert way—send for our engineers, without any obligation on your part.

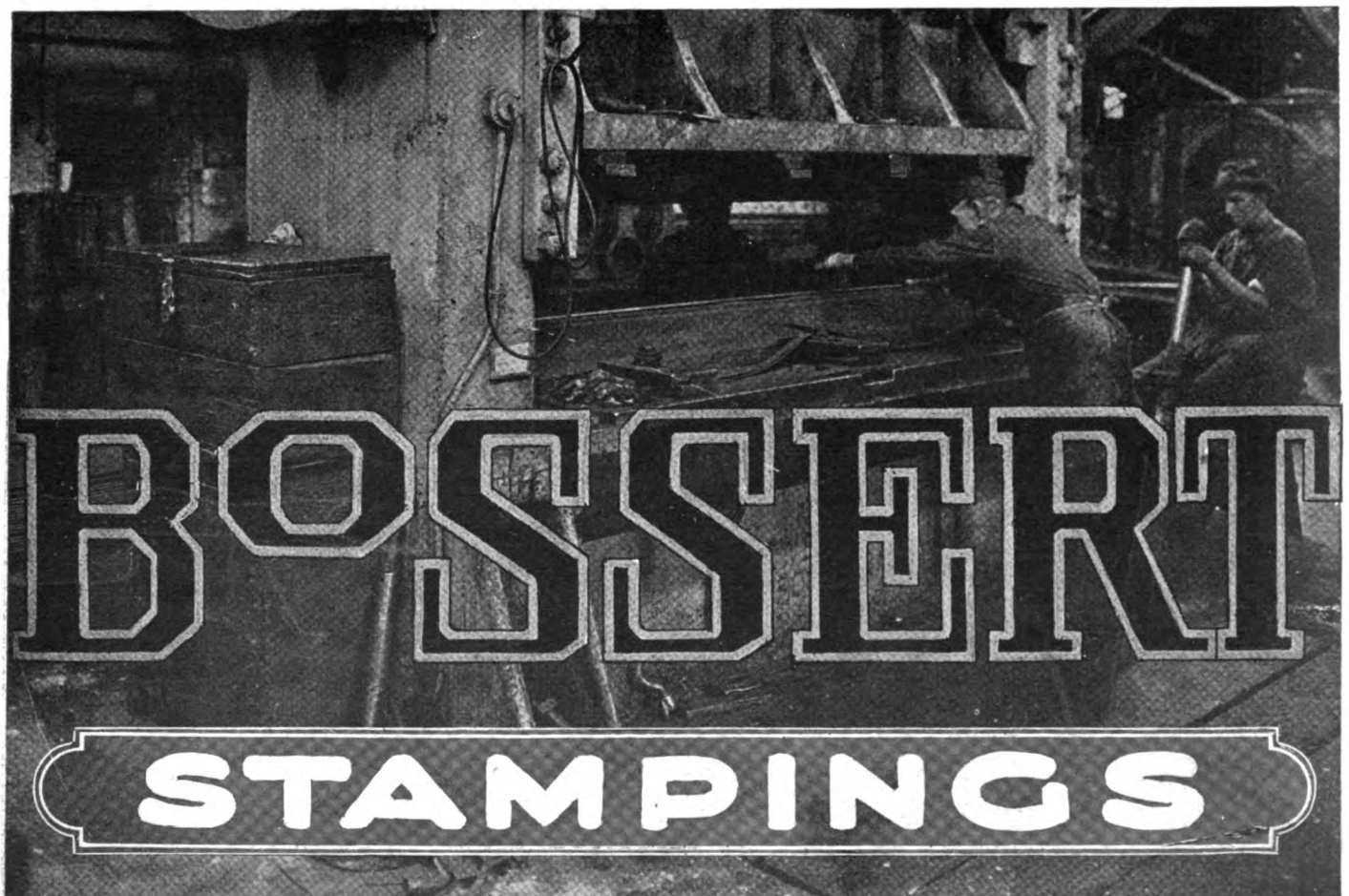
The Bossert Corporation,

Main Office and Works, Utica, N. Y.

Cleveland, Ohio, 611 Citizens' Bldg.

Branch Offices:
Detroit, Mich., 1518 Ford Bldg.

New York City, 30 Church Street.



MILTON

With Complete



Machining Service

The Point of Contact

WHEREVER your plant is located there is a Milton Man within call.

While his mission is to serve and sell, he is more than a service man, more than a salesman. To the user of Milton Service he is a metallurgical expert, foundry foreman and mechanical superintendent, in that he serves in the capacity of all three. His is a personal service, the point of contact between your organization and the Milton Service he represents.

Your casting problems become our problems, through him. Your machining difficulties are ours to solve, through him. Our extensive facilities for the production of electric steel castings and the machining of them, when desired, are placed at your disposal, through him.

Your request to our main offices places him, his knowledge and the service he represents at your elbow.

Milton deliveries are exceptional

Electric Steel Plant

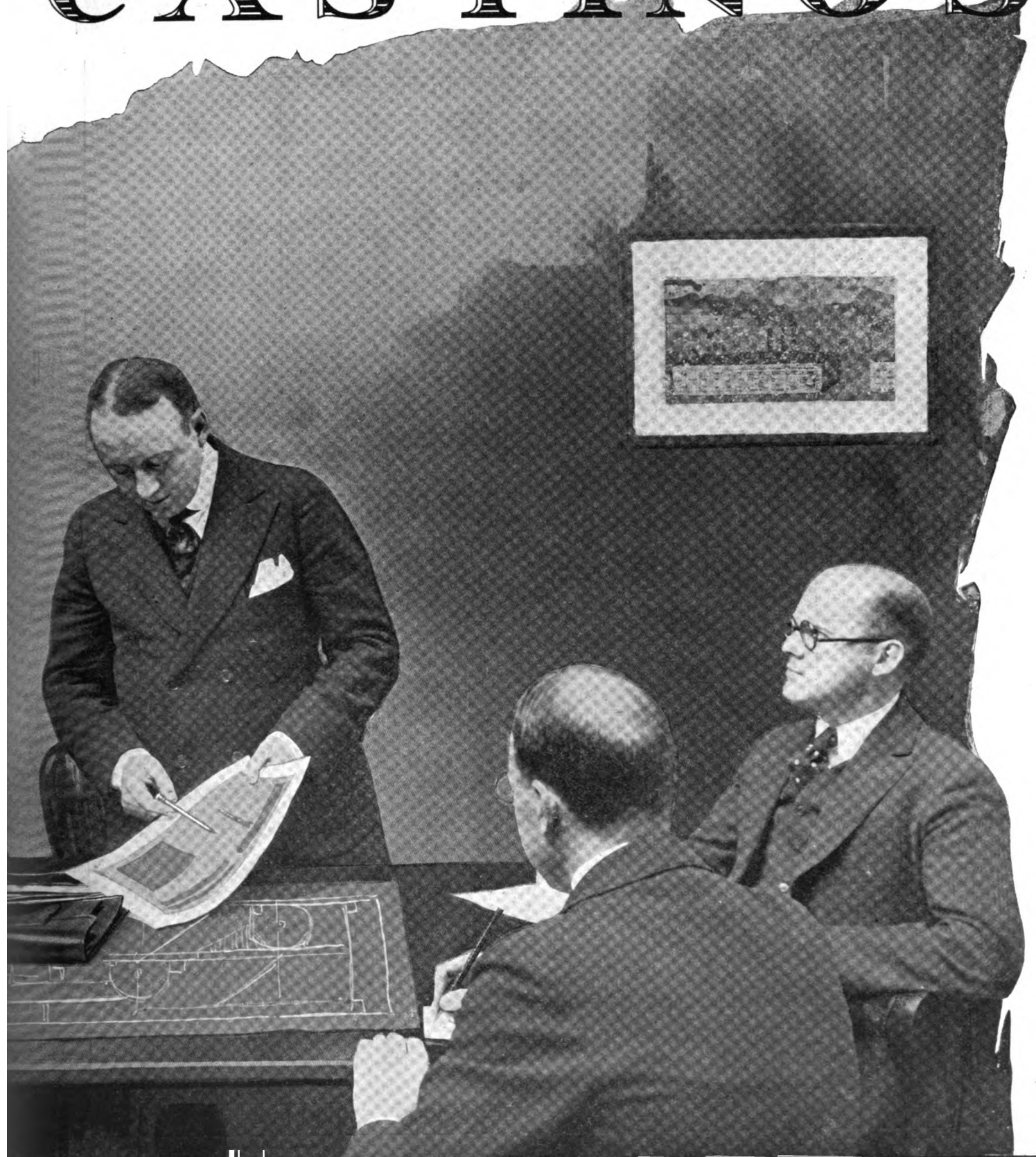
Milton Manufacturing Company
Milton Penn.

U. S. A.



There's a MILTON

ELECTRIC STEEL CASTINGS



SPARTON

MOTORHORNS



*Public Square
Cleveland*

Sparton Motorhorns Mean Safety for Motorists

Motorists whose cars are equipped with Sparton Motorhorns, drive with a feeling of safety in the most congested traffic or over tree-lined country roads.

They know their Sparton will not fail to send its peremptory warning when called upon to do so.

It is this desire for safety that has impelled many car drivers to remove the stock horns

from their machines and replace them with the reliable Sparton.

Sparton Motorhorns are so honestly made that their service is measured in years, and it is this same honest construction that assures their functioning at all times.

The worth of Sparton Motorhorns, Sparton Fans and Radiators and Sparton Fuel Feeders has resulted in their being chosen as standard equipment on many of America's best cars.

The Sparks-Withington Co.



Jackson, Michigan

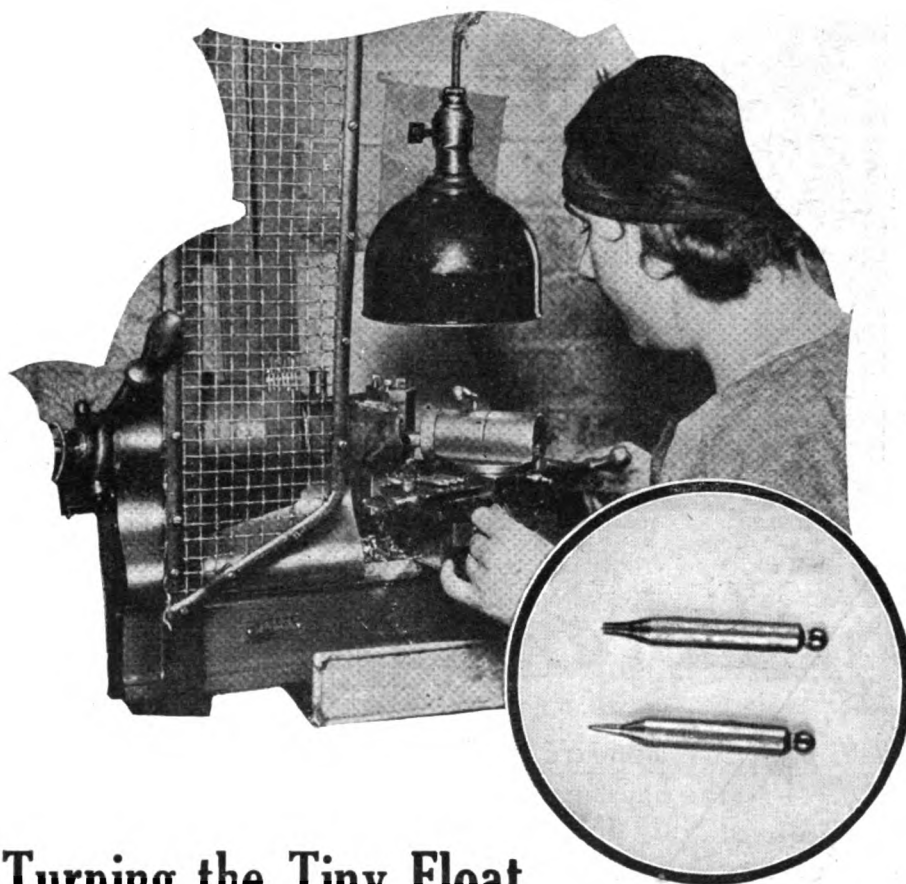
(206)

FIRST CHOICE OF AMERICA'S BEST CARS



RIVETT SERVICE

insures the profitable performance of Rivett Products from the day they enter your shop.



Turning the Tiny Float Valves of a Marvel Carburetor

The piece—a Monel Metal float valve for a Marvel Carburetor. The job—the finishing of this very small unit to .002" limits.

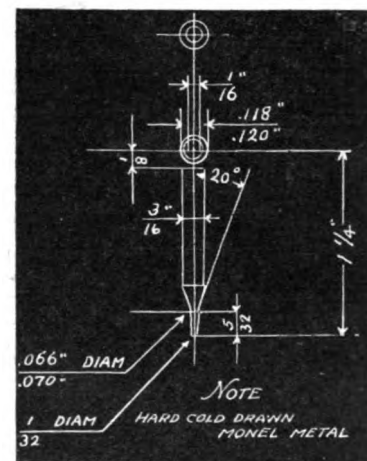
You have the indisputably clean-cut, precise performance of a Rivett No. 504 Precision Bench Lathe. And the results from the operation prove the superiority of this Rivett product for the very sensitive task put up to it.

A woman's delicate, careful handling guides the work to its accurate finish. The production

is so steady and so great as to seem out of place on a job so exacting. And yet, a skilled operator at the right Rivett machine insures results most satisfying.

You should know the world-famed line of Rivett precision bench lathes in detail. Their possibilities, in the tool room and on the manufacturing floor, are many and profitable. Send to our nearest dealer for literature or information in selecting the right machine for the job.

Know Rivett Machines
and
Profit By Their Use



RIVETT No. 505

Plain Precision Bench Lathe

Capacity—swings 8" diameter, takes 19" between centers.

Capacity for bar stock through head, 7/8" diameter.

RIVETT LATHE *and* GRINDER COMPANY

BRIGHTON DISTRICT of BOSTON, MASSACHUSETTS

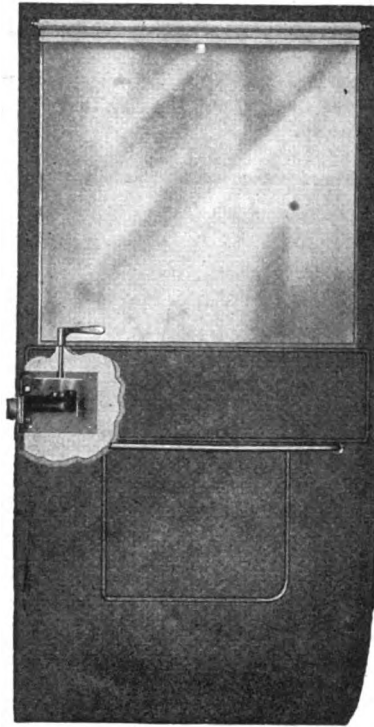
"MAKERS OF THE WORLD-KNOWN RIVETT PRECISION LATHE"

LIST OF AGENTS

DOMESTIC AGENTS: The Fairbanks Company, Boston, Mass.; Providence, R. I.; New Orleans, La.; Birmingham, Ala.; Purinton & Smith, Hartford, Conn.; Patterson, Gottfried & Hunter, Inc., New York City; Homer Strong, Rochester, Buffalo, Syracuse and Albany; D. Nast Machinery Co., Philadelphia, Pa.; Somers, Fittler & Todd Co., Pittsburgh, Pa.; Cleveland Tool & Supply Co., Cleveland, Oh.; J. R. Stone Tool & Supply Co., Detroit, Michigan; E. A. Kinsey Company, Cincinnati, Ohio; Indianapolis, Ind.; Dale-Brewster Machinery Co., Inc., Chicago Ill.; Blackman-Hill-McKee Machinery Co., St. Louis, Mo.; Portland Machinery Company, Portland, Ore.; Hallidie Machinery Co., Seattle, Wash.; F. O. Stallman Supply Co., San Francisco, Los Angeles, Cal.; F. E. Satterlee Co., Minneapolis, Minn.; Feden Iron & Steel Co., Houston, Texas; Smith-Courtney Co., Richmond, Va. FOREIGN AGENTS: H. W. Petrie, Ltd., Toronto, Ont., Can.; Williams & Wilson, Ltd., Montreal, Can.; Fenwick Freres, Paris, France, Belgium, Switzerland, Italy, Spain, Portugal; Buck & Hickman, Ltd., London, Glasgow, Manchester, Sheffield, Birmingham; Benson Brothers, Sydney, Australia; Yamatake Co., Tokio, Japan.



A single, easy motion—a quarter-turn of the handle—both unlocks and opens the door.



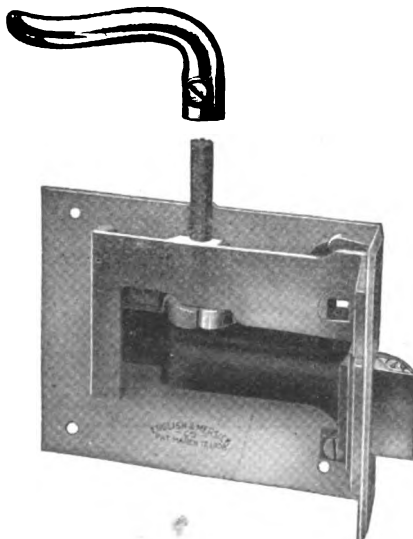
The Rotary Lever Lock will be exhibited at the New York Show—spaces D98-99, Fourth Floor, Grand Central Palace.

ENGLISH & MERSICK

Rotary Lever Lock



Visible on
Every Lock



NOW standard equipment on many of the finest motor cars. It is the choice of the body designer on the double basis of utility and beauty.

There's no unsightly slot in the finishing rail or inside upholstery of the door equipped with this lock. Its simple, easy action and substantial construction appeal to the car buyer of discrimination. It denotes that the car is the product of a manufacturer who considers quality and service first.

Rotary Lever Locks add a selling point to the car's value—and a talking point to the distributor's argument.

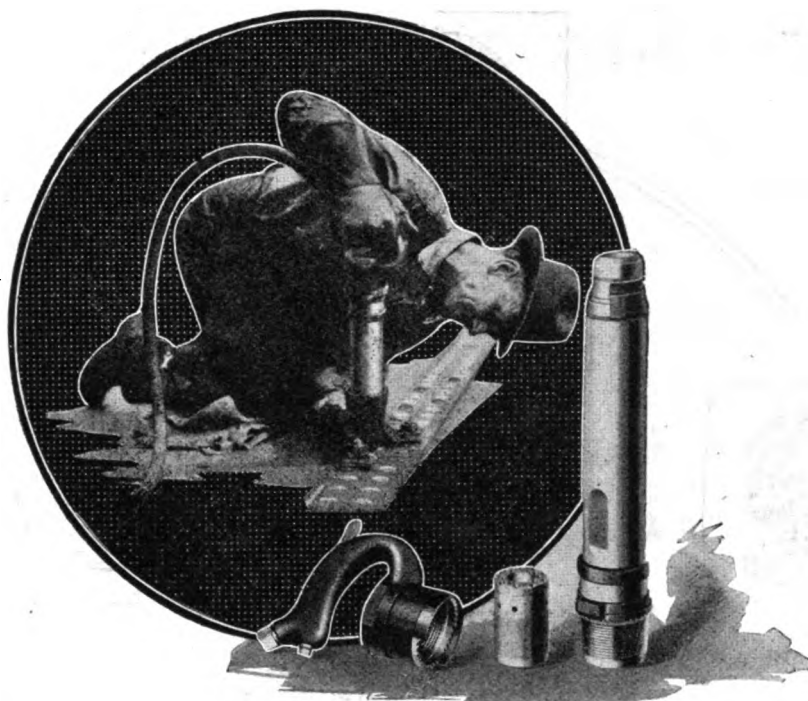
The **ENGLISH & MERSICK CO.**
New Haven, Conn.

Since 1860 makers of fine body hardware

Locks

Hinges

Handles



Why Boyers have three unit parts

GOOD to the last part defines the patented three-unit construction of Boyer Riveting Hammers. Each part is *separately* renewable and interchangeable with hammers of a like type.

Low upkeep costs prove the Boyer design logical, simple, dependable. Fewer than three unit parts increases maintenance costs, because the breakage or undue wearing of a major part then necessitates scrapping adjoining parts still serviceable.

Sustained, efficient service describes Boyer materials and workmanship. Boyer valves, for example, due to correct heat treatment, are *durable*. Boyer valve cases, by a simple reaming operation and the use of over-size valves, have *five lives*!

There's no other pneumatic hammer just like the Boyer. And Boyers, in a complete line, are obtainable from stock at Company Branches.

Ask for Boyer Hammer Bulletin 600.

Chicago Pneumatic Tool Company

Chicago Pneumatic Building · 6 East 44th Street · New York

Sales and Service Branches all over the World

•BIRMINGHAM •CHICAGO •DETROIT •EL PASO •HAMILTON •LOS ANGELES •MEMPHIS •NEW ORLEANS •NEW YORK •PHILADELPHIA •PITTSBURGH •PORTLAND •SAN FRANCISCO •SALT LAKE CITY •ST. LOUIS •TOKYO •VANCOUVER •WHEELING

BOYER PNEUMATIC HAMMERS · LITTLE GIANT PNEUMATIC AND ELECTRIC TOOLS
CHICAGO PNEUMATIC AIR COMPRESSORS · VACUUM PUMPS · PNEUMATIC HOISTS,
GIANT OIL AND GAS ENGINES · ROCK DRILLS · COAL DRILLS

BOYER

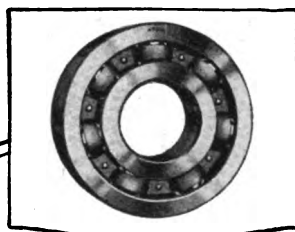
The world's standard



HAMMERS

wherever rivets are driven

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Strom radial bearing

We Make a Complete Line of Ball Bearings for All Applications

Strom radial, thrust, and angular contact bearings are made in a wide range of sizes for use *wherever a shaft turns.*

With our complete equipment we are able to give prompt deliveries on bearings for automobiles, trucks, tractors, and all types of machinery.

Our large staff of engineers is always at your service to help select and design the correct bearings for your needs.

Angular contact bearings especially designed to support combinations of radial and heavy end thrust loads.

U. S. Ball Bearing Mfg. Co.

(Conrad Patent Licensee)

4535 Palmer St.

Chicago, Ill.

Strom

BEARINGS



Single-acting thrust bearing with flat seats (grooved races). 1100F Series



Single-acting, self-aligning thrust bearing. 1100 Series



Double-acting thrust bearing, flat seats. 2100F Series



Single-acting, self-aligning thrust bearing with leveling washers. 1100U Series

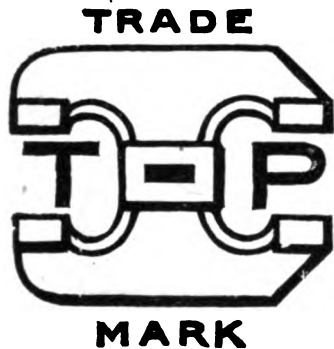


Double-acting, self-aligning thrust bearing. 2100 Series



Double-acting self-aligning thrust bearing with leveling washers. 2100U Series

When a prominent manufacturer



adopts a special tool, it is admitted that he may be saving money and time in his manufacturing processes.

When most of the prominent manufacturers

adopt and use Martell Reamers—such a consensus of opinion is unequivocal proof of their economy and efficiency.

Martell Reaming System

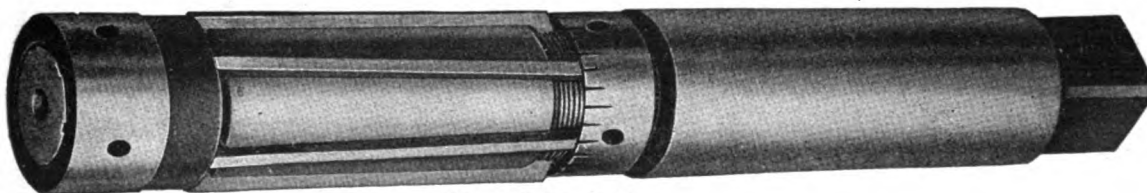
is used by Packard, Locomobile, Chandler, Oldsmobile, Lincoln, White and other automotive manufacturers—effecting a considerable saving in bearing fitting and finishing time—as well as producing equal if not better results than by hand.

The Martell Reaming System also includes adjustable reamers for use on machine tools (for reaming and finishing dead end holes to size) as well as adjustable hand reamers for reaming connecting rod bearings, and accurate holes in machinery for studs, bolts or pins.

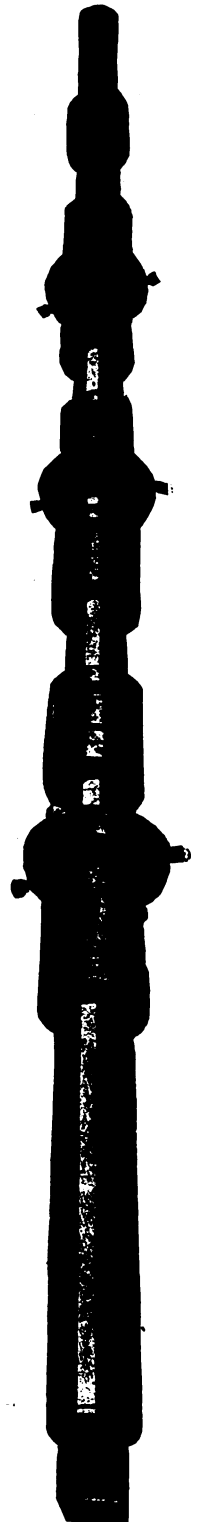
T. P. Bulletin 101L fully describes Martell Reaming System. Ask for a copy.



Martell Machine Reamer



Martell Hand Reamer



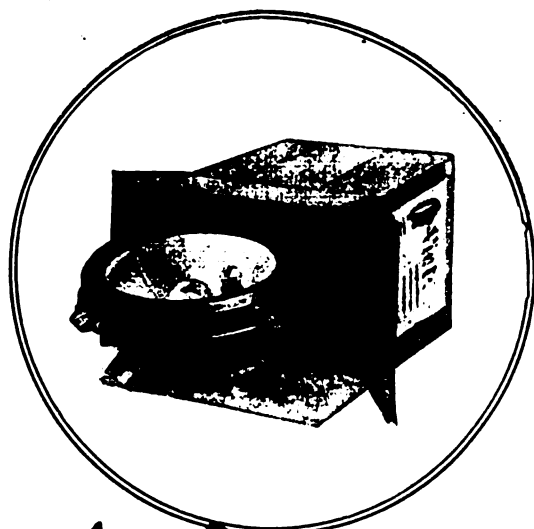
Martell Alignment Reamer

THE TAFT-PEIRCE MFG. COMPANY

WOONSOCKET  RHODE ISLAND, U.S.A.

TRADE MARK

New York—Woolworth Building
TAFT-PEIRCE PRODUCTS CARRIED IN STOCK BY Syracuse Supply Co., Syracuse, Buffalo, Rochester; Cadillac Tool Co., Detroit; Sherritt & Stoer Co., Philadelphia; Wm. M. Davis Supply Co., Cleveland; Northern Machinery Co., Minneapolis; Mid-West Machine & Tool Supply Co., Davenport, Iowa.



Victor

TRADE MARK

Lamps

The designing of automotive lamps is a distinct science, an art unto itself—its requirements are exacting, demanding thorough understanding and specialized skill.

For more than a generation The Corcoran-Victor Company has applied the accumulated experience of decades to automotive problems.

The result is the perfected Victor Lamp of today, a lamp which meets every automotive engineering need.

But at the age of 80 this organization has not ceased to grow; it does not regard its work finished.

And in this progressive spirit America's pioneer lamp-builders are prepared to approach your automotive illuminating problems; to adapt their experience and their technical skill to your requirements.

Call upon them today—they are men of constructive ideals to whom service is a privilege.

The Corcoran-Victor Company

710 Reading Road,

Cincinnati, Ohio

VICTOR LAMPS FOR MOTOR CARS, TRUCKS, MOTORCYCLES, TRACTORS AND AIRPLANES



Williams' Superior Drop-Forged Wrenches

The kind of a man with that kind of an arm wants that kind of a wrench—a Williams'.

"Drop-Forged Wrenches" and "Williams" are synonymous. Good men want good tools, and the best of them are satisfied with Williams' Wrenches. Machinists everywhere have been using them for nearly half a century.

40 STANDARD PATTERNS
IN STOCK, IN 1000 SIZES

Write for Wrench Book

J. H. Williams & CO.

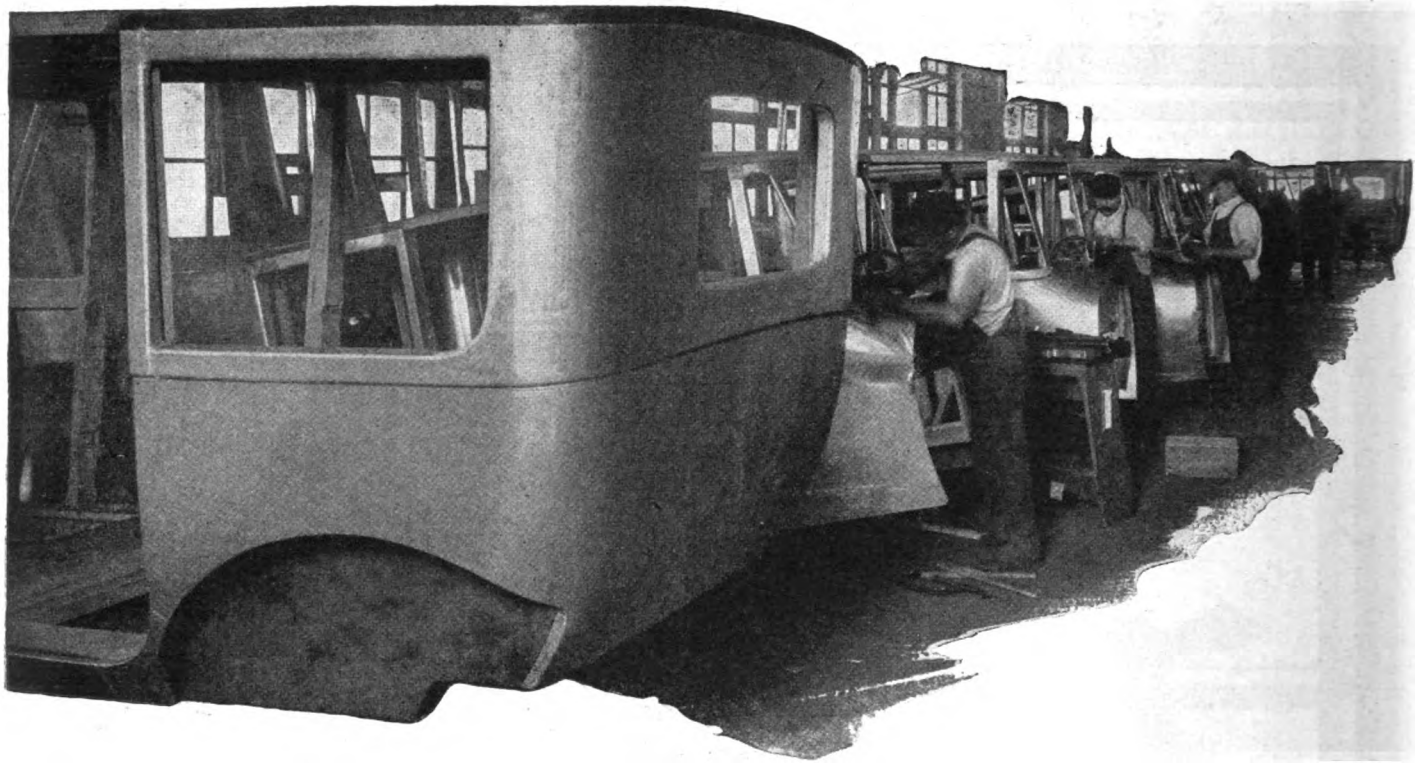
"The Wrench People"

BROOKLYN
10 Richards St.

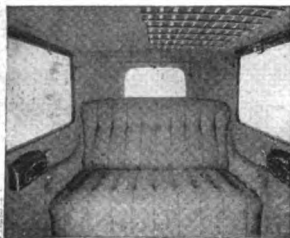
BUFFALO
10 Vulcan St.

CHICAGO
1010 W. 120th St.

ST. CATHARINES, ONT., CANADA



A Unique Service in Body-Building

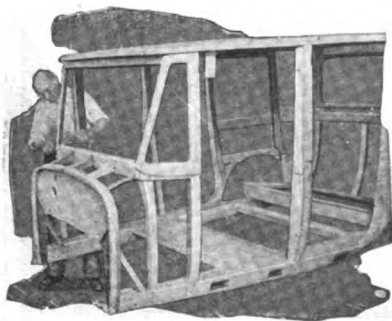


Body-design, body-construction and body-mounting are engineering problems demanding long and intensive experience if errors and pitfalls are to be avoided. *Knowing what not to do* ranks in importance with *knowing what to do*.

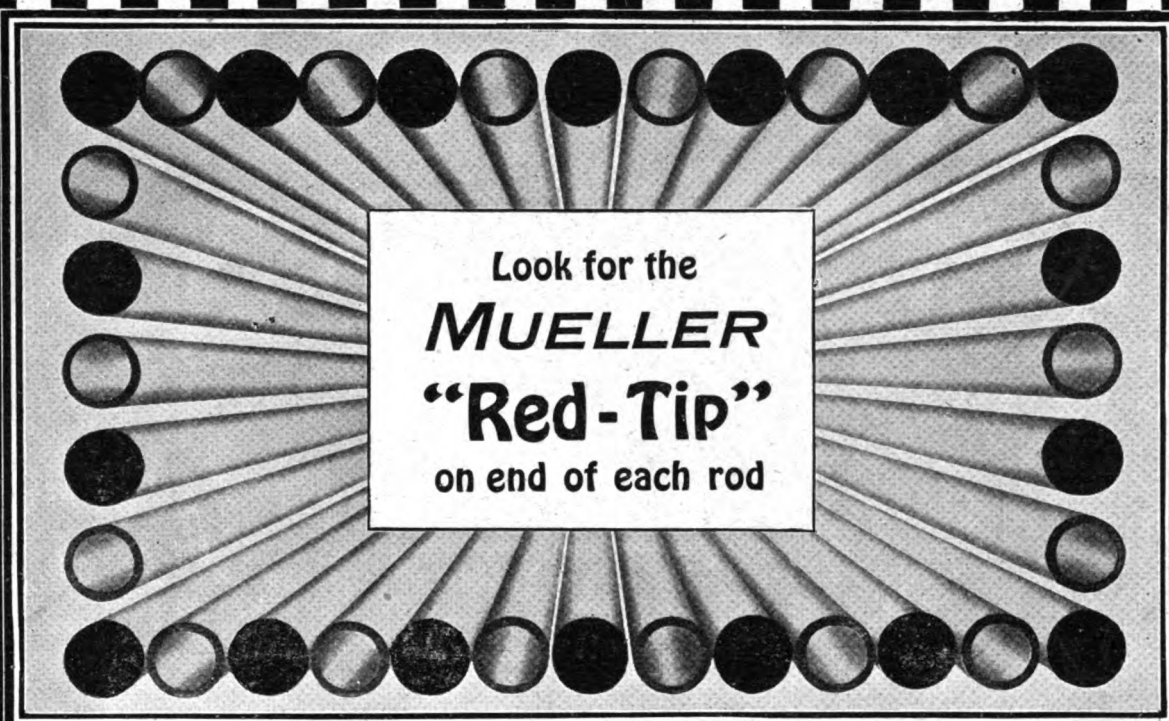
The Raulang organization will bring to your problems a thoroughly-rounded experience which qualifies it to co-operate with you as a special department shouldering the responsibility for your enclosed body work.

Raulang engineers are qualified to create new but wholly practical designs, censor and revise faulty construction-proposals, advise as to best methods of mounting, keep you informed as to trends of style in foreign bodies, aid you in selecting those features and accessories which most notably influence sales, and, in every other detail, serve as authoritative counsellors on enclosed body-problems.

More than sixty years of coach-building experience, of which nearly twenty were devoted to enclosed body work for our own complete-car production, give Raulang engineers a unique understanding of a customer's needs and problems.



RAULANG BODY DIVISION
The Baker R & L Co.
CLEVELAND, OHIO, U.S.A.



Look for the
MUELLER
"Red-Tip"
on end of each rod

Mueller "Red-Tip" Brass Rod

For three generations *MUELLER* Brass Products have stood all tests, and today, *MUELLER* is still the acknowledged authority on Brass — the foremost manufacturer of Brass Products in America.

Mueller Brass Products

- *MUELLER* "Red-Tip" Brass Rod is made by the extrusion process—with a chemical laboratory test of every heat before extrusion, thus insuring uniform and standardized quality.

Write for price list and detailed information.

MUELLER METALS CO., PORT HURON, MICH.

Makers of "Red-Tip" Brass Rod; Brass and Copper Tubing; Forging and Castings in Brass, Bronze and Aluminum; Die Castings in White Metal and Aluminum; also Screw Machined Products.

H. Mueller Manufacturing Co., Decatur, Ill., and Sarnia, Ont.
Makers of Water, Plumbing and Gas Brass Goods and Tools.



YOUR motor doesn't give its best when chilled by Wintry blasts—much less will it do so if the oil in the crank case is a frozen mass, which happens to many oils otherwise good. Battery, bearings, cylinders, all suffer from lack of lubrication occasioned by frozen oil.

SUPREME AUTO OIL *Flows Freely* at Zero—starts with the engine—splashes and pumps in the coldest weather, never failing to properly lubricate every part.

Your dealer can perhaps supply **SUPREME AUTO OIL**—*Look for the Sign of the Orange Disc*, or write us for particulars and nearest dealer.

Dealers not yet contracted should stock at once. Address nearest office.

GULF REFINING COMPANY

General Sales Offices:
PITTSBURGH, PA.

District Sales Offices:

New York
Atlanta

Philadelphia
New Orleans

Boston
Houston

flows freely at zero.



R. F. Heinrich

© Clark Equipment Co 1921

"THE SPIRIT OF TRANSPORTATION"

Max Bohm
Franklin Booth
George Elmer Browne
James Cady Ewell
R. F. Heinrich
Frank X. Leyendecker
Jonas Lie
St. Luis Mora
Alphonse Mucha
Maxfield Parrish
C. Coles Phillips
William Mark Young

Civilization has progressed only as methods and means of transportation have improved. Appreciating the contributions to transportation and world advancement made by the American Automotive Industry, we have invited these well known artists to dramatize, each in his own manner, "The Spirit of Transportation."

CLARK EQUIPMENT COMPANY
BUCHANAN MICHIGAN

MANUFACTURERS OF
CLARK AXLES and CLARK STEEL WHEELS
FOR GOOD MOTOR TRUCKS

*These paintings will be
on exhibit as follows*

NEW YORK
Hotel Commodore
January 8th January 15th

CHICAGO
Congress Hotel and Annex
January 29th February 4th

BOSTON
Copley-Plaza Hotel
March 12th March 19th

*He honors himself best who
honors his industry most*

Gear Specialists For 12 Years

So intricate is the task of producing perfect gears that many discriminating vehicle manufacturers wisely entrust it to the veteran Covert organization.

For 12 years we have specialized on gears for Covert Transmissions. Today you can get Covert gears—in Covert Transmissions—in every type of automotive vehicle.

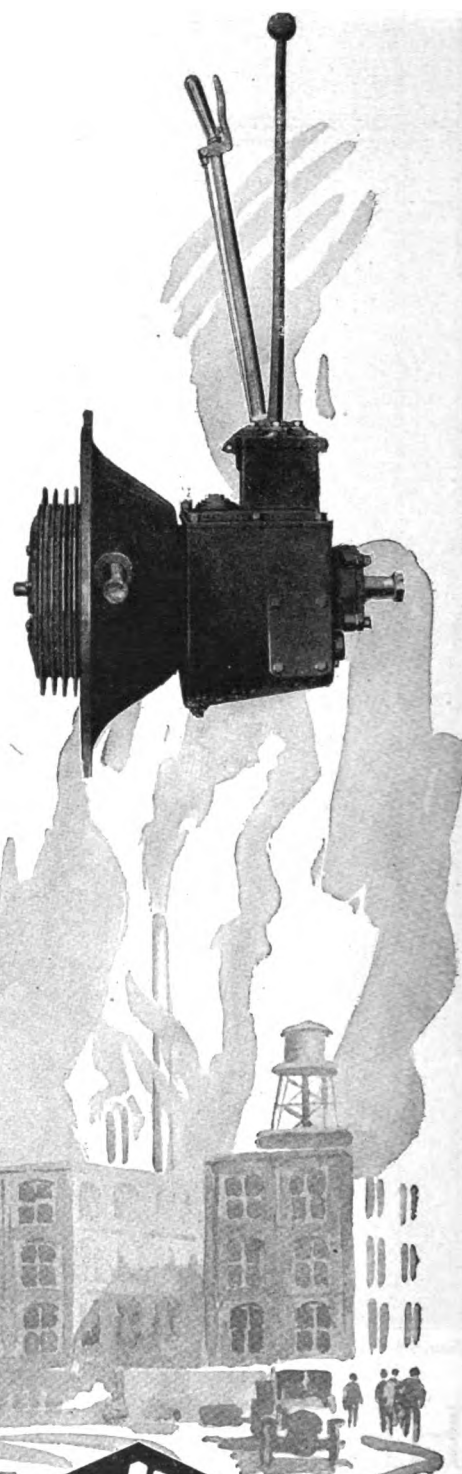
Covert Transmissions are not cheap Transmissions.

The vehicle builders who thus equip their products are buying from us because of Covert quality alone. Gears—and transmissions—mechanically perfect are an asset to them and their customers.

See to it that your next automotive purchase comes equipped with Covert Clutch and Transmission.

COVERT GEAR COMPANY, INC.

Sales, Engineering and Factory: Lockport, N. Y.
Export Offices: 100 Broad Street, New York City



Athol Top Material a close relative to ATHOLEATHER

Having convinced manufacturers of the goodness of Atholeather and that, as an imitation, it really does "Outlast the Natural," we have introduced *Athol Top Material*, thus increasing our ability to serve.

Athol Top Material is the result of "prolonged investigations in the field. From various sources we learned the faults that became only too apparent through neglect and abuse on the part of the car owner."

To overcome these objectionable features, costly experiments were made and the efforts of our chemists were directed to the elimination of this dissatisfaction by anticipating the cause. The result is a "top material of obvious quality. A material slightly heavier and more flexible than the ordinary top material - - but withal thoroughly waterproofed. " " "

To supply the trade with *Athol Top Material* we have constructed and equipped a large complete, modern, factory at " " Detroit - - and are now in production.

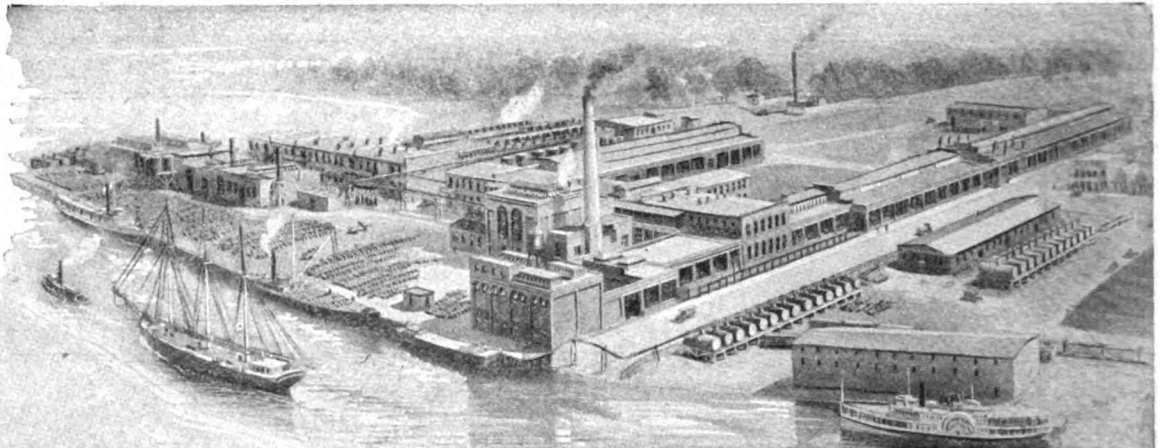
Just as Atholeather has proved its quality, as an upholstery fabric, so will " " *Athol Top Material* establish itself favorably in the industry. " " "

Samples of *Athol Top Material* and Atholeather are always available. " " Write for booklet of swatches. " "

ATHOL MANUFACTURING CO.

Athol,
New York
505 Fifth Avenue.

Massachusetts.
Detroit
1216 Book Building



This illustration shows how the coating of Zapon is impervious to water. Wash it as often as you wish—it will not check, fade or discolor.



Try to tear a piece of Zapon. Clutch it firmly and jerk, pull, twist—do anything that would tear an ordinary article. You will find that you haven't harmed the cloth even to the extent of leaving finger marks.



Fold a piece of Zapon and hold it in hands as shown. Then whip the creased part back and forth as often as you like. Now examine the coating—you'll find the surface still unchanged, proving conclusively that Zapon will not crack, check or peel.

You helped make **ZAPON** what it is

You, who for many years have been buying and buying, repeating and telling others, are responsible for the improvements and present superior qualities of Zapon.

Your purchases led to increased capacity and lowered cost, so that now Zapon is the economical covering.

You suggested colors, grains and finishes and helped to make the Zapon line what it is today.

Your endorsements of our brands—Muleskin, Broncho, Mustang, Moroccoline and Randco—have made them standard.

The experience of more than thirty years is given in Zapon quality.

ZAPON LEATHER CLOTH COMPANY

200 Fifth Avenue

New York City

Chicago Detroit Los Angeles St. Louis

Leather Cloth of Quality

FIRST IN THE INDUSTRY—STILL IN THE LEAD

ZAPON

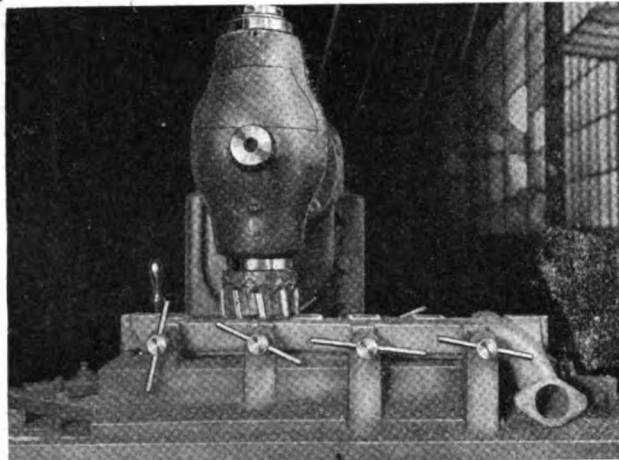
The principal Zapon brands are Muleskin, Broncho, Moroccoline, Mustang and Randco

Leather Cloth

On Exhaust Manifolds

Photograph through the courtesy of the Haynes Automobile Company. In automotive shops everywhere Milwaukee Milling Machines are every day proving their value in increased production, quality of output, low upkeep and ease of operation.

**Milwaukee
Milling
Machines**



HERE is shown one of the advantages through the use of Milwaukee Attachments.

Here we see a Milwaukee Horizontal Milling Machine transformed into a vertical milling machine through the use of a Milwaukee Vertical Spindle Attachment. Like all Milwaukee Attachments, it becomes practically an integral part of the machine, giving thorough satisfaction. In shops where the work does not warrant the purchase of both types, one of these attachments will just about double the usefulness of the Milwaukee Horizontal Milling Machine you already have or are planning to buy.

Know this line of machines and attachments thoroughly. Send for the Milwaukee catalog TODAY.

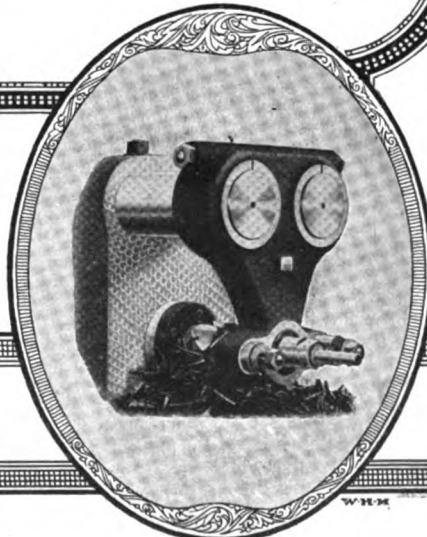
Kearney & Trecker Company

Milwaukee

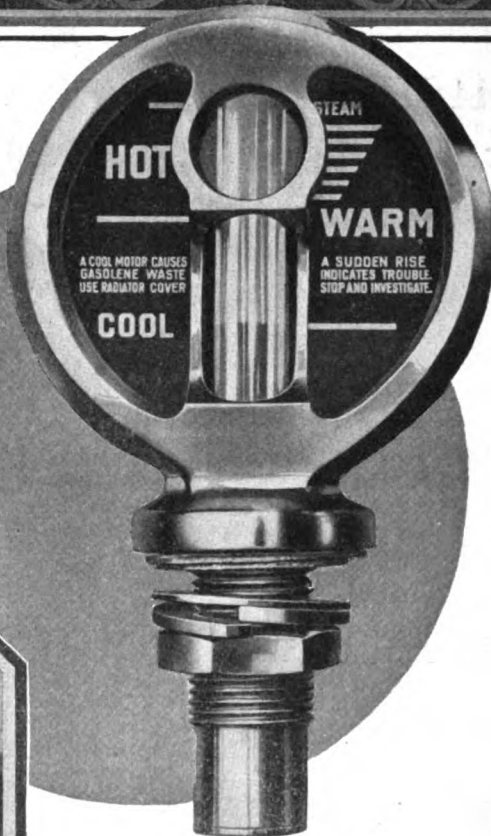
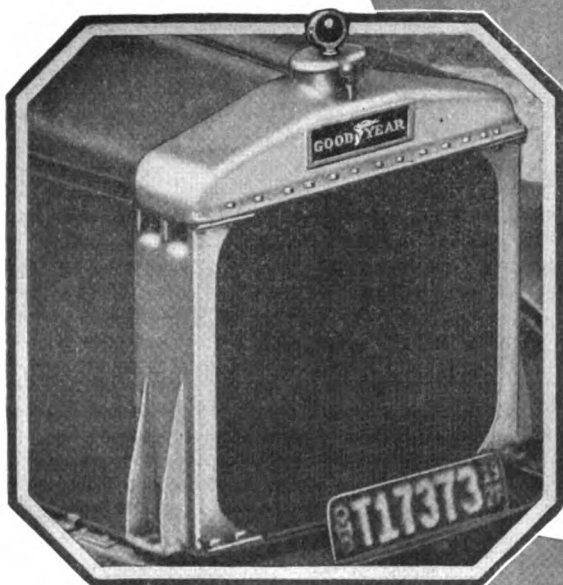
Wis., U. S. A.

Branch Offices in Chicago, Cleveland, New York

**The Double Overarm maintains
permanent alignment of the arbor.**

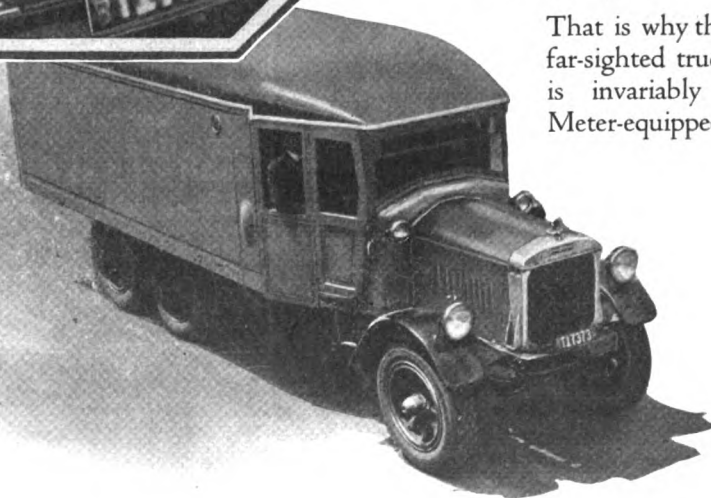


BOYCE MOTO METER



WHEREVER the tests involve consistent and economical engine performance, as in the experiments carried out by the Goodyear Company, you will always find the Boyce Moto-Meter on the truck's radiator cap.

That is why the product of the far-sighted truck manufacturer is invariably Boyce Moto-Meter-equipped.



THE MOTO-METER CO., Inc. Long Island City, N. Y.

—seventeen men with a single creed

Every drop forging that leaves our plant is a working symbol of the faith and industry of each of the seventeen executives who head our organization.

From the President, Vice-President and Treasurer all down the line to the various department foremen one creed directs the work, one goal is held in sight—production of quality forgings that shall reflect nothing but credit upon their makers.

Those who know our organization best remark about the well developed and most unusual team work—the spirit of co-operation that shows itself best in the quality of our products.

We can handle immediately orders for forged parts for passenger cars, motor trucks, tractors, trailers, airplanes, motorcycles, gas and oil engines, etc.

Capacity—Forgings $\frac{1}{4}$ lb. to 150 lbs.

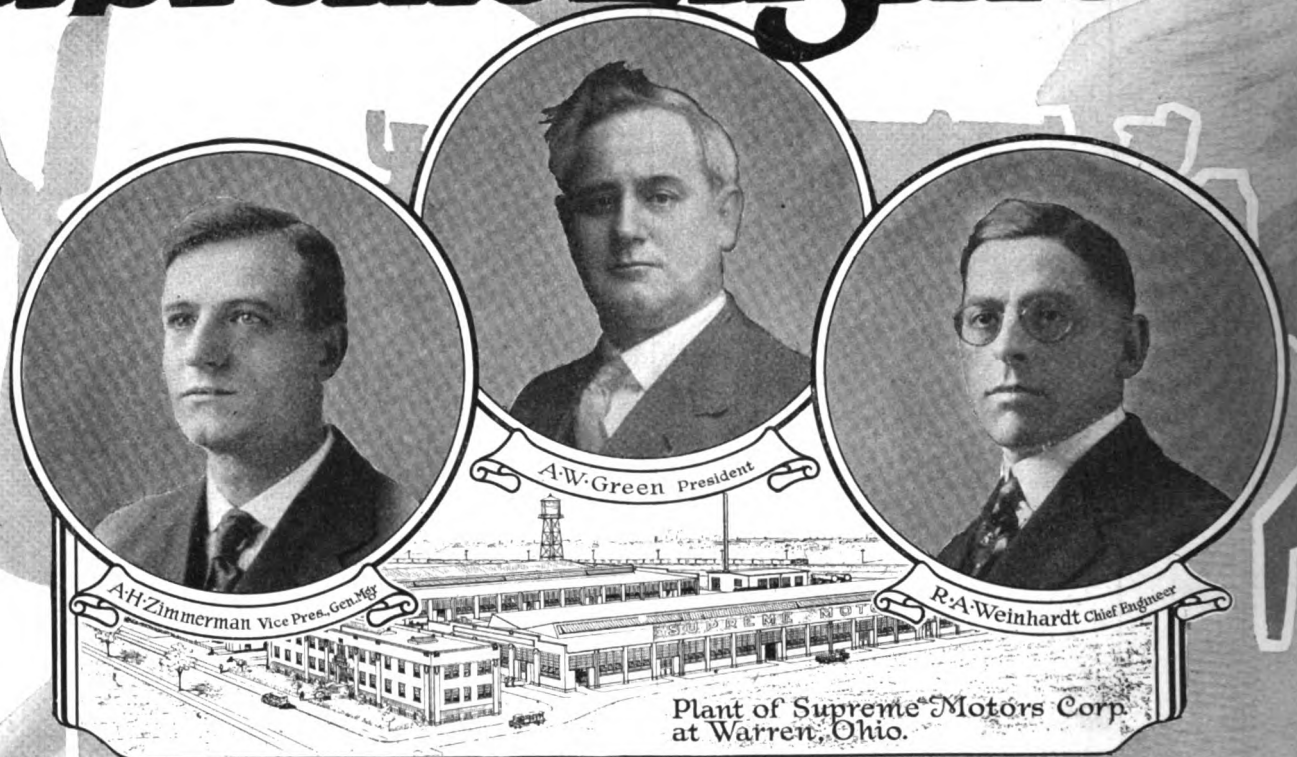
Your inquiry for further information will receive prompt attention.



WESTERN DROP FORGE COMPANY

MARION, INDIANA

Who Makes the Supreme Engine?



BACK of any great achievement stands personality. Back of the promise of great performance there must be shown a personality that guarantees the promise.

The proven product of The Supreme Motors Corporation as the fulfillment of the demand for a quality power unit manufactured on a large scale production basis—can mean only as much to the Automotive Industry as the personnel of the organization means.

On this judgment the builders of SUPREME Engines are willing to rest: For,

gathered together in the Supreme Organization are a group of men whose names have been prominently identified with the building of the best engines since the early days of the industry.

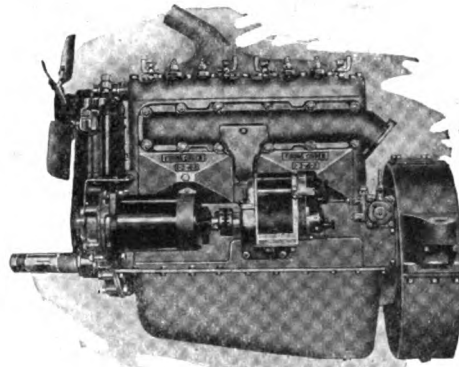
The experience of such men as Green, Zimmerman and Weinhardt is your guarantee of the calibre of men associated in this great undertaking.



Supreme

"PEAK OF P"

Type S-4
4-Cylinder
Engine



Some Facts About SUPREME ENGINES

S-4

4-Cylinder Engine

For passenger cars weighing up to 2800 pounds; speed wagons up to one ton; trucks up to 1½ tons.

Force feed lubrication thru hollow camshaft and drilled crankshaft.

Rigid crankshaft with liberal size bearings.

Hot spot manifold for low grade fuels — exceptional economy.

Sturdy, compact balanced construction means vibrationless performance.

5-K

6-Cylinder Engine

For passenger cars weighing up to 3400 pounds.

Force feed lubrication thru hollow camshaft and drilled crankshaft.

Inherently balanced massive crankshaft, having ample bearing areas.

Combination manifold for volatilizing fuels—sends refined dry gas to combustion chambers.

Carburetor mounted on either right or left side of engine.

Freedom from vibration insures long life and continuous service.

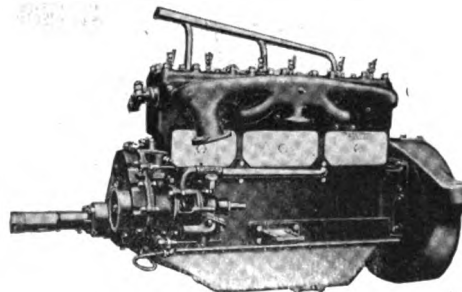
Accessibility of both models is keynote of design

SUPREME MOTORS CORPORATION

Factory and General Offices

WARREN

OHIO



Type 5-K
6-Cylinder
Engine
3¼ in. x 5 in.

Engines

POWER"     



You
Demand
Quality

Here it is!

“Van Dorn”
GEARING

THE VAN DORN & DUTTON CO.

GEAR SPECIALISTS
CLEVELAND OHIO.



On Stewart

BUSH RADIATORS were adopted by this manufacturer six years ago when his first chassis went out "on test" and you'll find BUSH RADIATORS on every STEWART since then.

Ample radiation, strength in each integral part, accessibility for rapid repairs, when necessary; and the best application of established radiation principles are the features which have encouraged manufacturers like STEWART to confine their radiator purchases to BUSH.

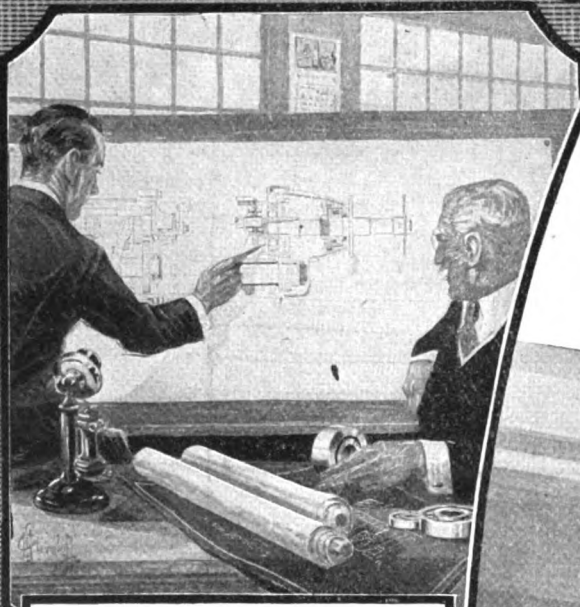
One of the hand operations that illustrates the care and skill that enter into a Bush Radiator. Doing it by hand may be slower but it makes for a better job.

BUSH MANUFACTURING COMPANY
Hartford Conn.

Bush radiators

NEW DEPARTURE

Ball Bearings



The importance of the correct choice of bearings is all out of proportion to the cost or size of that bearing.

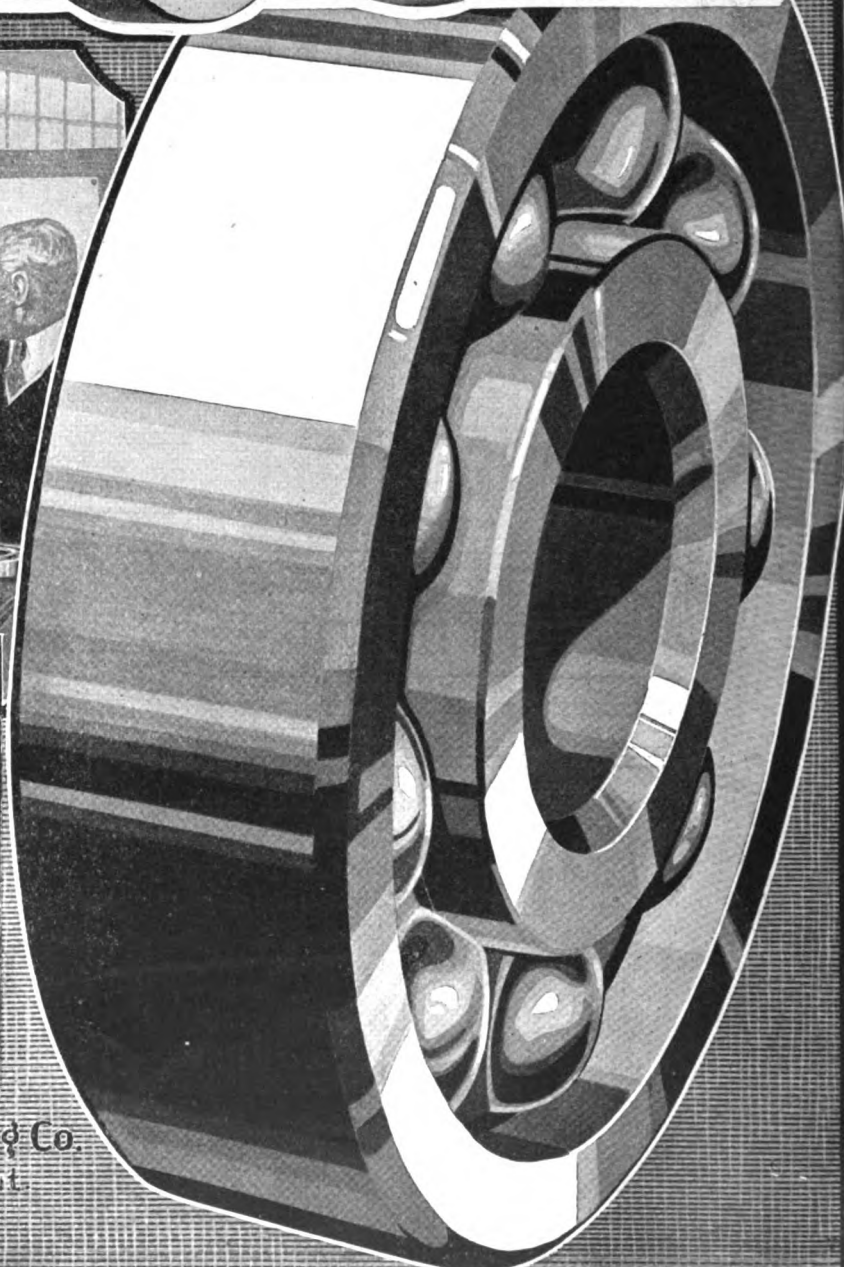
A bearing failure may be very far reaching in its effect. The gears that it locates and supports may be ruined, if life itself is not endangered.

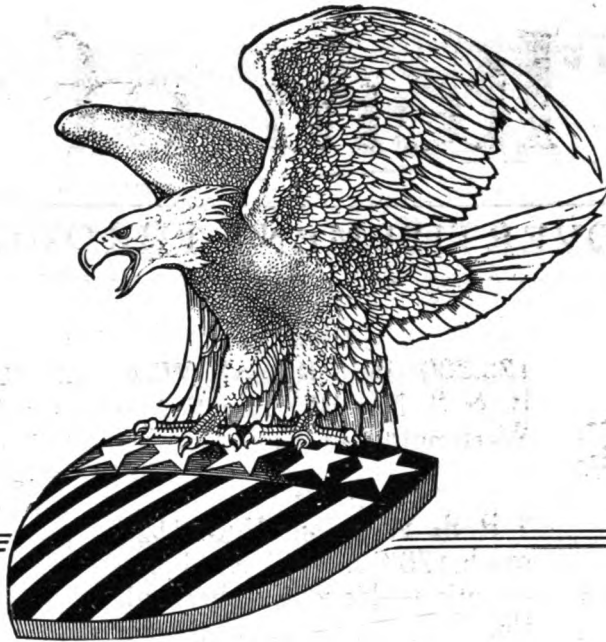
The faith of eminent engineers in the New Departure is based as much upon observation of the bearing in practical service as in laboratory tests.

CONRAD PATENT • GERMANY

569

New Departure Manufacturing Co.
Bristol, Connecticut
Chicago, Detroit





How Much War Department Surplus Property Can Be Absorbed by Your 1921 Output?

Nearly one hundred thousand individual orders representing sales amounting to nine hundred million dollars is the staggering total of property disposed of through War Department sales to date.

The buying power of America has responded to these sales in a big way, many manufacturers looking to them as a regular source of supply.

Thousands of machines purchased through this channel are in operation. Thousands of motors, generators and other electrical equipment are supplying heat, light and power in every industry. Huge quantities of chemicals have found their way to use through these sales. Thousands of tons of iron and steel from this source have been wrought into every conceivable tool and commodity.

Now is the Time to View Your Future Needs



New products must be produced and sold on a different basis. A basis that recognizes that the 1921 output must be sold to a "buyer's market." This necessitates marked economies in the purchases of equipment and supplies.

The total of machinery and engineering materials still to be offered, while enormous, is not inexhaustible, and this new and different market, with its necessary purchasing economies, promises an ever-growing demand for the remaining stocks.

Consider the possibilities of War Department sales from this angle. The more your 1921 output can absorb the better will be your position under the new selling conditions. The quicker you act, the better your chances of sharing the opportunities offered.

Read Every Item on the Following Pages

WAR DEPARTMENT "Surplus Property Sales"

Every Item of Pertin

ROUTE THIS ADVERTISEMENT THROUGH YOUR PLANT SO

Eastern Division

E-891

2—Steel Structural Shapes, 54-2 x 7-4. Location—Philadelphia, Pa.

E-616

60—Switchboards, 3 wire, 25 KW., 250 volt. Location—Schenectady, N. Y.

14730

145—Cock Valves, 2"-D-6264. Location—Norfolk, Va.

20129

937,458 lbs. Barbed Wire, painted black. Location—New Cumberland, Pa.

14714

880 Tons Barbed Wire, black. Location—Schenectady, N. Y.

17857

206 Reels Barbed Wire, 4 point. Location—Washington, D. C.

20249

125,300 lbs. Barbed Wire, B. & S. No. 10. Location—Washington, D. C.

13648

7 Rolls Weaving Wire, 1 1/4" mesh, 78" x 100' x 11 ga. Location—New Cumberland, Pa.

3531

1,235,695 ft. Wire, bare out-post strand. Location—New York.

15303

6 Pulleys, Differential Cap, with double wheel and chain. Used for hoisting. Mfrd. by Yale, Towne Mfg. Co. Location—New York.

E-885

150 Heavy Wire Screens, 3/4" mesh, 18" wide. Location—Philadelphia, Pa.

E-884

450 Heavy Wire Screens, 1 1/4" mesh, 6' 3" wideligs. Located—Philadelphia, Pa.

12644

5233 lbs. Tool Steel, 1 1/2" square, No. 3 temper, for cutters and scrapers, etc. Unannealed. Location—New York.

E-608

22,385 lbs. Strip Steel, cold rolled, oiled. 2" x .050" x 6' to 8'. Packed in bundles weighing from 120 to 180 lbs. Location—New Cumberland, Pa.

10635

2716 Air Tanks, equipment for charging. Location—Philadelphia, Pa.

13187

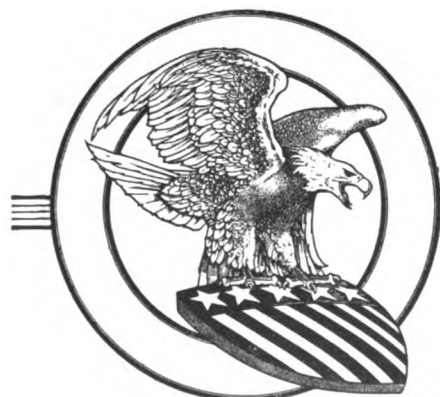
1-90 Gal. Galvanized Iron Tank. Location—New Cumberland, Pa.

122 Inside Calipers. Location—Washington, D. C.

96 — Calipers, firm joint, double No. 173-6" and 12". Location—Pittsburgh, Pa.

3005

4—Condensers, W. E., 33 GH, mounted on wooden base; capacity 2.20 M.F. used in telephone service. Mfrg. Western Elec. Co. Location—Philadelphia, Pa.



WAR IDEAS

"Surplus Property"

ent Interest

THAT EVERY DEPARTMENT MAY BENEFIT

2—Connections, Reducers, straight lengths, 20", one end 6", 8" ball holes 1 1/8" diam. Parts for refrigerating plants. Location—Philadelphia, Pa.

14200

9—Hammers, Riveting No. 90, with 7/8" button head rivet sets. Mfrd. by Ingersoll Rand Co. Location—New York.

4 Conveyors, gravity sections, 22" x 121" iron frame. Location—Baltimore, Md.

13631

1—Hoist, 4 ton capacity with 12" lift, Wright High Speed. Location—Norfolk, Va.

13638

2—Independent Engines; double swinging cylinders; compound geared; equipped with reversing valve. Location—New York.

E-642

29,875 ft. Discharge Hose, 2" dia., 4 ply, 25' lengths. Coupling and clamp attached. Location—Pittsburgh, Pa.

2752

1—Steam Engine, with generator 85 HP. Location—New Cumberland, Pa.

E-643

12,500 ft. Discharge Hose, 2" dia., 4 ply, 25' lengths. Coupling and clamp attached. Location—Pittsburgh, Pa.

13625

92—Hammers, Riveting, steam operating No. 5. Little David chipping and parts. Location—Norfolk, Va.

E-644

37,375 ft. Discharge Hose, 2" dia., 4 ply, 25' lengths. Coupling and clamp attached. Location—Pittsburgh, Pa.



MACHINERY and ENGINEERING MATERIALS List No. 13

Sold By Negotiation

HOW TO ORDER

All orders and negotiations for materials offered in this list must be addressed to the Depot Quartermaster of the division where material is located. These divisions and the addresses of controlling offices are given below. To obtain a complete list of materials not listed in this advertisement, clip and mail the attached coupon.

LIST OF DIVISIONS AND CONTROLLING OFFICES

Eastern Division
59th St. & 1st Ave.,
Brooklyn, N. Y.

Central Division
1819 West 39th St.,
Chicago, Ill.

Southern Division
Transportation Bldg.,
Atlanta, Ga.

Southwestern Division
San Antonio, Texas

Northeastern Division
Army Supply Base
Boston, Mass.

COUPON

Chief Sales Promotion
Section, Office
of the Director of
Sales, Room 2515,
Munitions Building,
Washington, D. C.

IMPORTANT
Mail Coupon
To This Ad-
dress.

Kindly send M. & E. M. List No.
13.....in its entirety.
Firm Name
Street Address
City State.....
Signed By
Automotive Ind.

ARTWORK
erty Sales



ADDITIONAL ITEMS
from
MACHINERY AND ENGINEERING MATERIALS
List No. 13
TO BE SOLD BY NEGOTIATION

Aneroid Barometers
Cannister Bottoms
Compass Boxes
Ratchet Braces
Brass Grommets
Brass Fasteners
Brass Hock Parts
Brass Loops
Brass Rivets
Brass Slides
Brass Studs
Brass Washers
Lead Covered Cable
Telephone Cable
Cable Releases
Canvas, O. D.
Concrete Push Carts
Compass Watches
Duck, O. D.
Dynamite
Gas Mask Eye Lenses
T. N. T. Cylindrical
Trench Fans
Flashlights
Fuses
Fuse Dust
Generator Sets
Air Hose
Suction Hose
Expansion Joints
Electric Knives
Metal Forming Machines
Machine Check Writers
Motors
Cannister Nozzles
Oil for Break Switches
Loom Oil
Lard Oil
Quenching and Tempering Oil
Pipe Fittings

Nipples
Malleable Pipe
Sewer Pipe
Signal Plugs
Galvanized Bit Plugs
Steel Springs
Rubber Tape
Cannister Tops
Tripods for Heliographs
Wrist Watches
Plain Copper Wire
Resonators
English Screws
Shanks for Indicator Posts
Bar Steel
I-Beams
Structural Steel
Wrought Iron
Angle Posts
Screw Posts
Galvanized Rods
Corrugated Iron Shelters
Crucible Tool Steel
Steel Hoops
Tool Steel
Vertical Tubular Boilers
Level Books
Plant Construction Books
Logging Carts
Beaded Edge Casings
Zincographic Chests
Campenars
Chief Operator's Desks
Drawing Boards
Motor Fuses
Meat Grinders
Knife Grinding Machines
Gun Box Board
Hob Nails
Engine Lathes

Motors for Grinders
B. T. Boilers
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SURPLUS PROPERTY BRANCH

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WAR DEPARTMENT
"Surplus Property Sales"



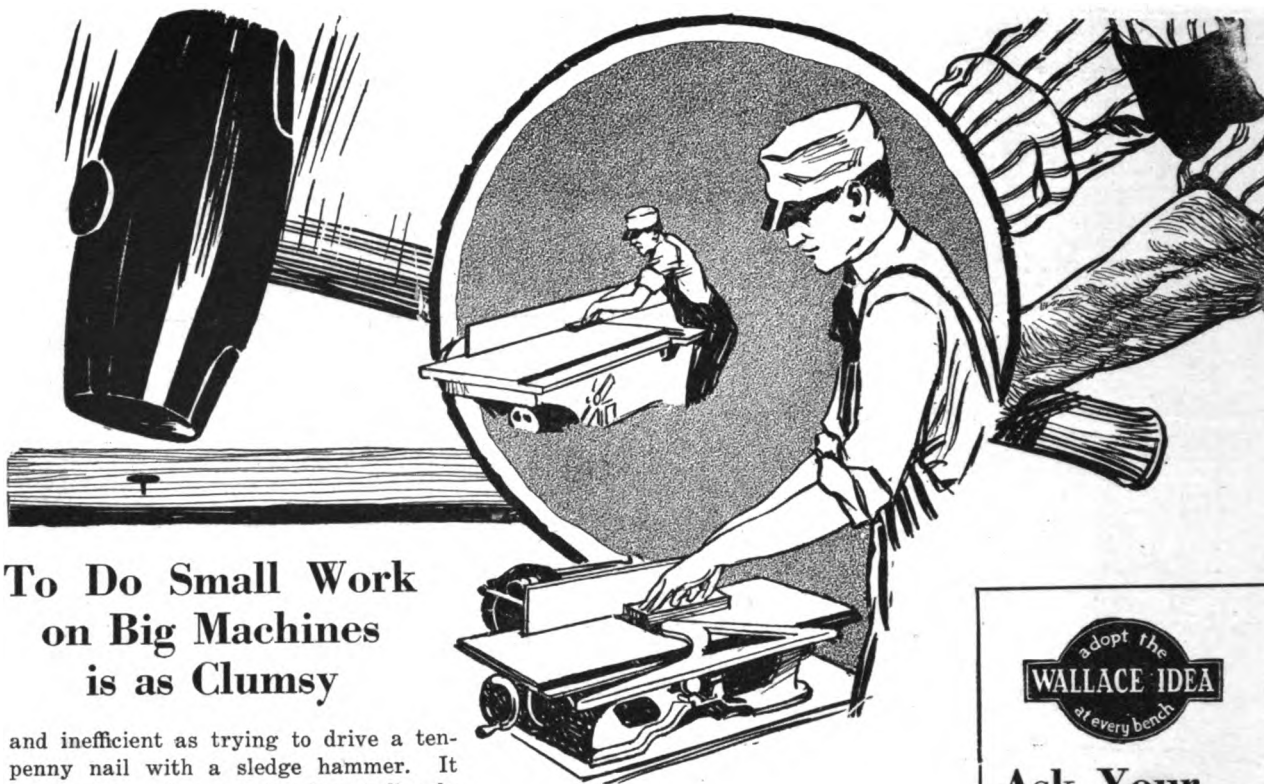
—and then the
machining

Modern machines and the best tools comprise the equipment in every department of the Lycoming Plant with skilled, experienced labor at the bench. All these features justify the Lycoming pledge of constant performance that goes with each Lycoming Motor.

LYCOMING MOTORS CORPORATION
Williamsport, Pennsylvania



LYCOMING MOTORS



To Do Small Work on Big Machines is as Clumsy

and inefficient as trying to drive a ten-penny nail with a sledge hammer. It can be done, of course, but how tediously a man must work, and because it is tedious it is therefore slow, hazardous and mighty costly for you.

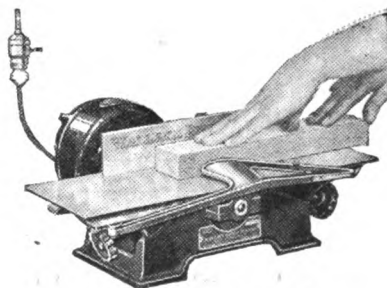
Think it over—it is a new thought, and when one is accustomed to doing a thing one way it is not very easy to see it another. But try sawing, trimming or jointing or any of the operations in cabinet, pattern or assembling work on big machines. You are very careful and always apprehensive.

If you had a smaller machine, the Wallace Bench Planer or Jointer or Saw, you would run this stock over in a jiffy and be done in half the time.

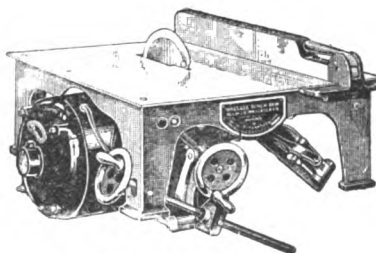
Then, too, besides this decided time saving advantage of using Wallace Bench type machines for bench work, you profit by other advantages, i. e., you can take these Wallace Bench Machines to the work—they are portable. They set on the bench or along the side of it and at the elbow of the workmen, thus they save many time consuming trips to the big machines and so handy the men do little, if any, hand sawing or planing.

No wonder over 10,500 Wallace Bench Planers, Jointers and Saws are in daily use. You will find them at every bench in many pattern or cabinet and carpenter shops and in production work in plants.

Investigate the Wallace Idea, for we know it will pay you. Ask any high class machinery dealer—phone or write us.



**The Wallace Bench
PLANER**



The Wallace Bench Saw



Ask Your Machinery Dealer

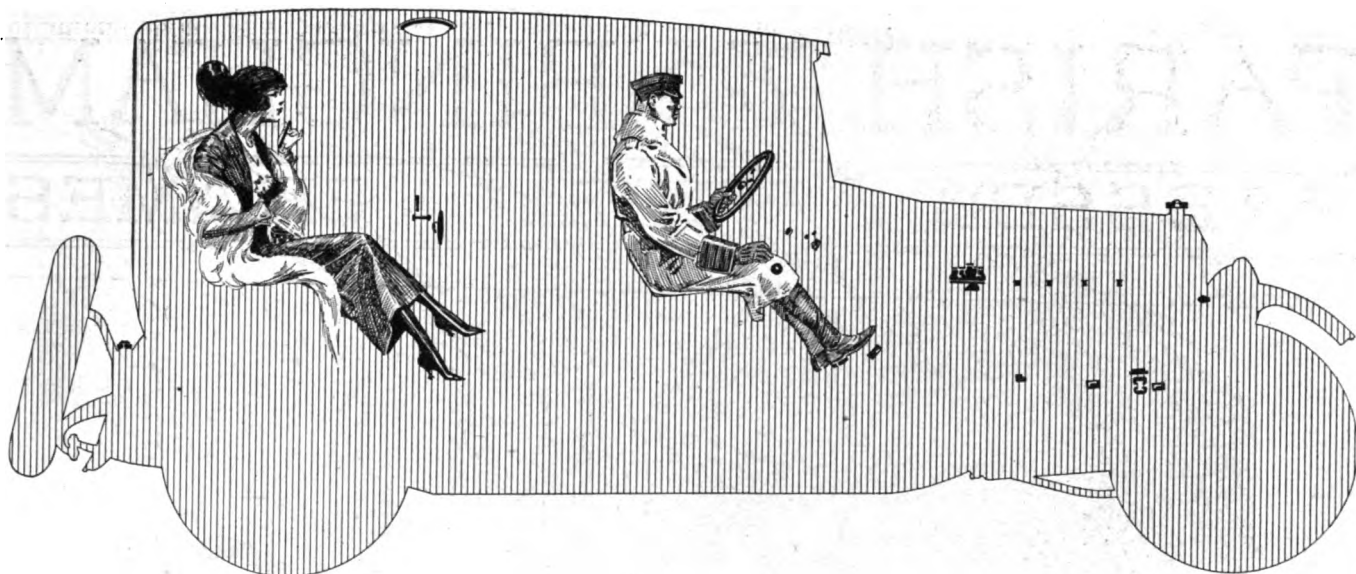
Wallace Bench Machines are sold by regular dealers who have anticipated your requirements—they are familiar with the performance of these machines now in use, and their advice is therefore based on actual experience.

Our regular dealers have machines available to demonstrate the adaptability of the Wallace idea to the various operations you have in mind, and they are in a position to make prompt delivery from stock. They carry a full line of repair parts and instructions.

J. D. WALLACE & CO.

1422 W. Jackson Blvd.

Chicago, Ill.



LATCH HANDLES
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TELEPHONE RECEIVER
LAMP BASES
FILLER CAPS
SWITCH KNOBS
METER CASES
FUSE BOXES
CHOKER HANDLES

VENTILATOR ADJUSTING
KNOBS
HORN PUSH BUTTONS
STARTING SWITCH BASES
GEAR SHIFT LEVER BALLS
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COIL COVER
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STARTING MOTOR CABLE
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TERMINAL SLEEVES
SPARK PLUG CAPS
CABLE SEPARATORS

NO longer is molded insulation considered a mere detail, for since the advent of Condensite it has become an essential part of the modern car.

The above illustration gives an idea of some of the uses to which Condensite has been applied in the automotive industry.

A glance at our No. 6 pamphlet—sent on request—may prove the solution to that problem before you.

Condensite Company of America, Bloomfield, N. J.

Condensite

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PRESSED STEEL FRAMES



Frame Makers For Cars
of Quality Since 1904

—this quality standard is reflected by the other pressed steel products—axle housings, brake drums, torque arms, step hangers and running boards. Send blue prints and specifications for quotations.

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MICHELIN

Disc Wheels

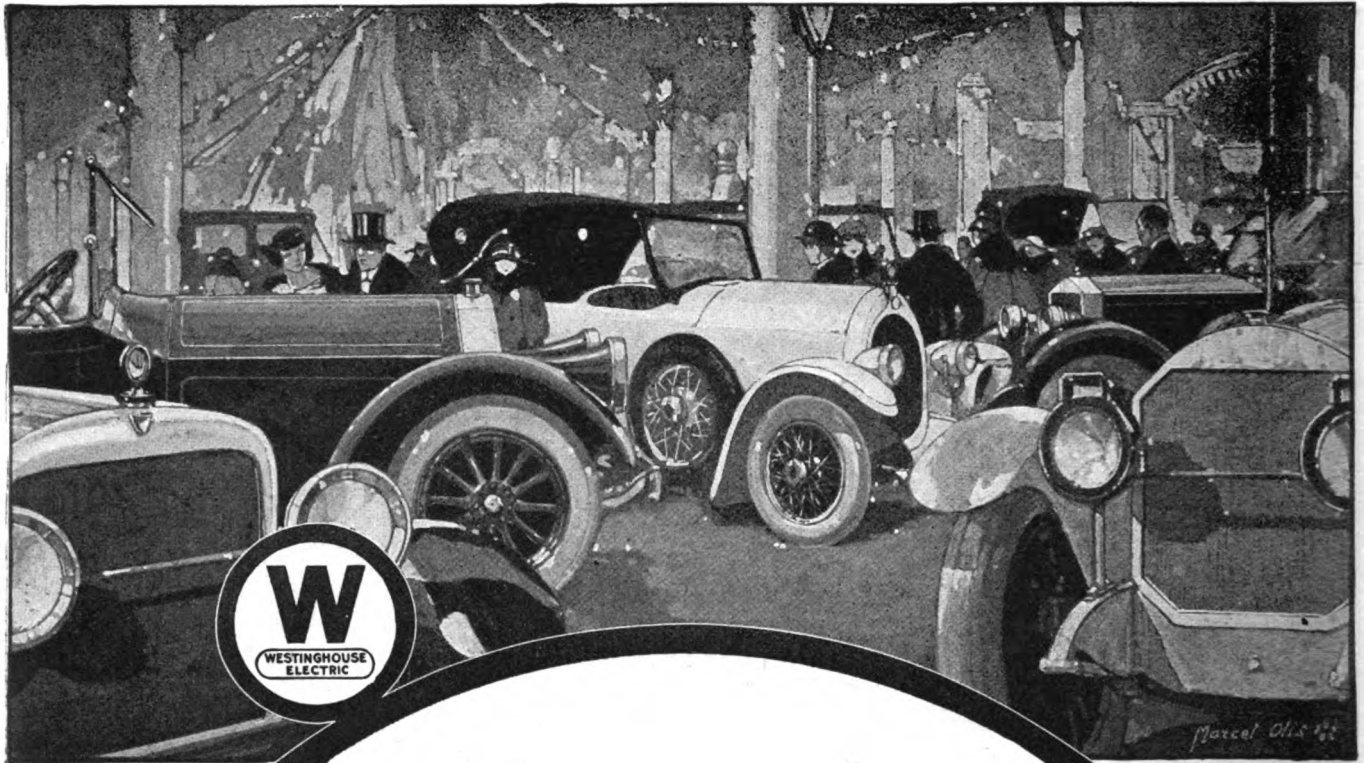


THE intrinsic merit of Michelin Disc Wheels is becoming better known, month by month, thru Michelin Wheel Advertising. Will your cars for 1921 be equipped with these advanced wheels?

Manufactured and sold in the United States exclusively by the

BUDD WHEEL CORPORATION

PHILADELPHIA



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The *fine car* earns its place by *additional* values in appointment and ability. It embodies all the refinements, all the justifiable superlatives, that good automotive practice has so far developed. It is classified on a basis of admirable performance and beautiful appearance.

The makers of such cars, whether here or abroad, can take no chances on the electrical equipment obtained from outside sources. They test for *additional* values, as usual.

It is surely significant that so many of them turn to Westinghouse for Electric Automotive Equipment.

WESTINGHOUSE ELECTRIC & MANUFACTURING CO.

Automobile Equipment Department

General Sales and Service Offices: 82 Worthington St., Springfield, Mass.

Works: East Springfield, Mass.

Westinghouse

ELECTRICAL EQUIPMENT FOR AUTOMOTIVE VEHICLES

Buy Broaches on a QUALITY Basis

QUANTITY should be the first requisite when buying a broach. For, the life of the broach depends on quality and, after all, it's broaching service you are buying—not merely a device to cut holes.

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It is this broach quality, this broach accuracy—insuring maximum broaching service and maximum quantity production—which has put the J. N. Lapointe Company's broaches on a plane where price is a minor consideration.

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Makers of Broaching Machines and Broaches:

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The excess power engine, strong traction pull and quality work throughout enables the Towmotor to prove its remarkable hauling powers in every day use. It is successfully solving plant-haulage problems in every branch of industry.

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Bulletin No. 2 explains this sturdy little traction giant. May we send you a copy? Write today.



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The quality of the constituent parts that enter the construction of motor trucks these days is scrupulously watched by builders, because these parts determine the performance and survival of the complete vehicle. Unless there is assurance that parts will serve creditably there can be no assurance that the truck will endure.

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Front Axles
for
Speed Wagons
Light Trucks

QUALITY

The inclusion of Flint Front Axles in the specifications proves that the manufacturer realized the worth of quality parts—the wisdom of building for a permanent reputation instead of a low price.

Flint Front Axles are designed especially for speed wagons and light trucks from 1,000 lbs. to 2 tons. They are Timken equipped. Send for blueprint and specifications.

Flint Motor Axle Company
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Ingersoll-Rand Co., Phillipsburg, N. J.

And correct hardening results from the use of the HUMP METHOD.

The HUMP shows when the piece goes through the critical point. The rate of heating is put under your control.

Results can be duplicated by repeating the heating curves and quenching from the same point with reference to the HUMP.

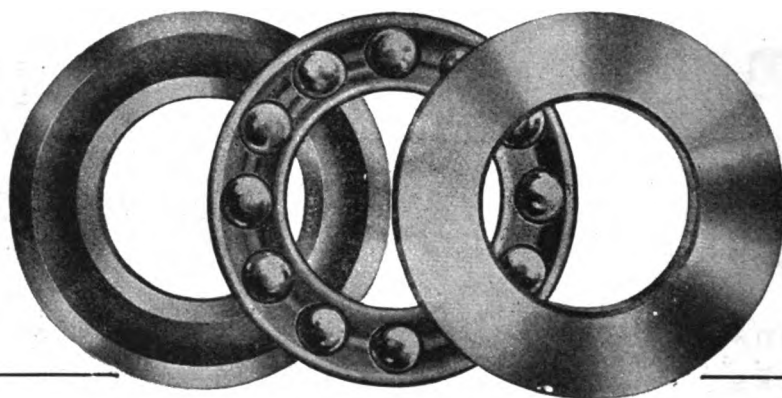
Catalogue 90T describes the HUMP METHOD and equipment.

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*Electrical Measuring Instruments
Pyrometers—Hump Electric Furnaces*

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1304 Monadnock Block
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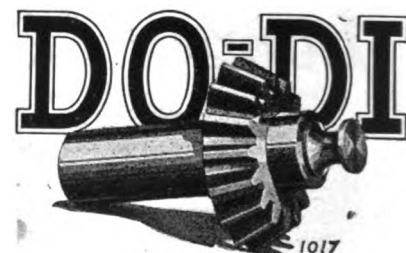


THRUST BALL BEARINGS manufactured to your exact requirements.
 "STAR" BALL RETAINERS for thrust, magneto and cup and cone bearings.
 DROP FORGINGS.

THE BEARINGS COMPANY OF AMERICA
 LANCASTER, PENNA.

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The use of "Do-Di" finished brass castings is a logical means of lessening the cost of many machine parts. They can be made to minute limit measurements and in either brass or bronze alloys.

They have the advantage of sharp outlines, perfect contour, greater accuracy, all holes cast and absolute uniformity of the metal. The cost of machining a sand moulded part, plus the waste of superfluous metal and the frequent rejection after machining makes the use of "Do-Di" finished castings an important economy.

We will be glad to tell you of the work of this kind we are doing for others.

Ask for pamphlet on
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THE WORLD'S LARGEST MANUFACTURERS OF DIE CASTINGS

DOEHLER DIE-CASTING CO.

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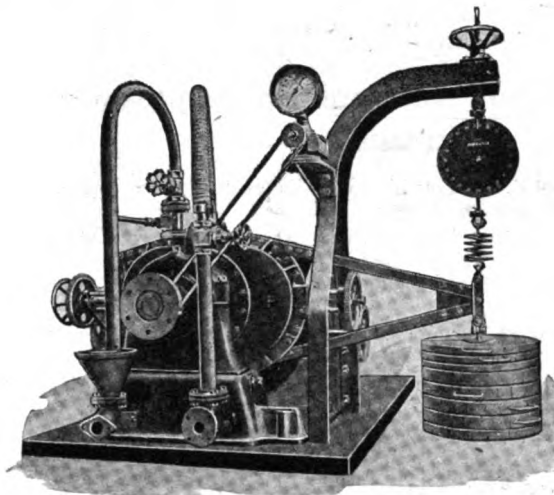
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Are Now Made and Distributed in the United States

FROUDE DYNAMOMETERS

are built in all sizes and in special types for testing or running-in gas engines. Each dynamometer has a large range in both capacity and speed.

**FROUDE DYNAMOMETERS**

are scientifically accurate, inexpensive and easily operated. They run silently and either load or speed, or both, may be varied while operating.

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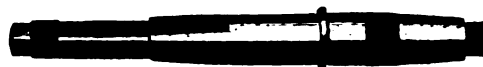
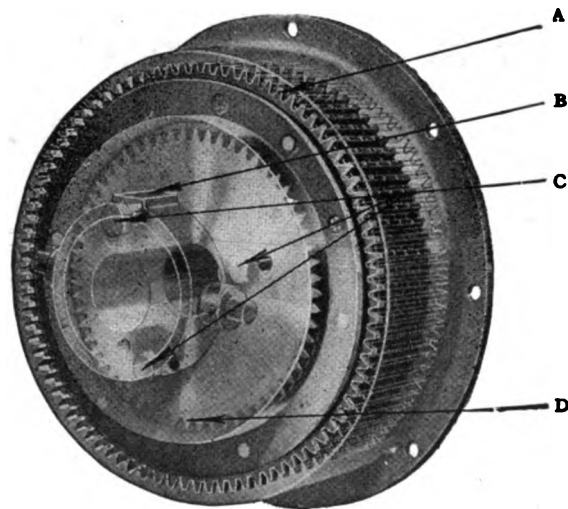
C. H. WHEELER MANUFACTURING CO.**PHILADELPHIA****PA.***Write for interesting, illustrated bulletin.*

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*The Velvet Clutch**With the Bull-Dog Grip***Eliminate Doubt in Performance**

Probably no other part has a greater effect on the ease of handling than the clutch; and much of the popularity of Detlaff clutches is due to their smooth yet positive action. Added to this is a freedom from trouble that insures continued satisfaction that is measured by years.

Our engineering department will gladly co-operate with you to fit the Detlaff to your layout.



A.D.—Gear Tooth drive on all discs.

B.—Lubrication from any convenient point.

C.—Long, easy springs compensate automatically for facing wear.

Detlaff Clutches will be shown at the 6th National Tractor Show at Columbus, Ohio. We shall be glad to send complimentary tickets to interested visitors.

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(52)

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Electric Drills****The kind of tools your men have pleasure
in using**

Give a man a tool that makes his work lighter and easier, and he will repay you with increased output.

Thor Universal Electric Drills, light, powerful, easily controlled and well balanced, insure greater speed and efficiency on light drilling operations. Portability and economic operating costs bid for consideration in reduction of costs.

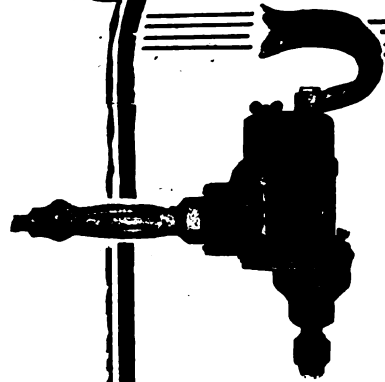
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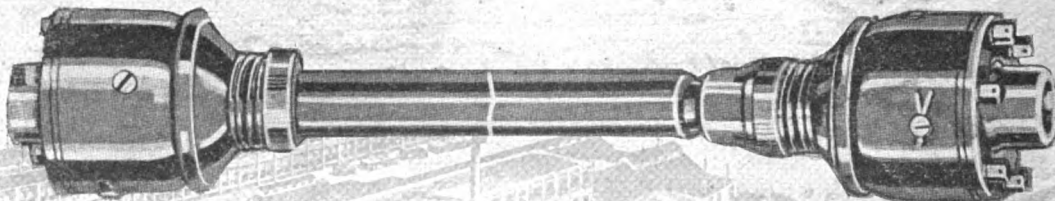


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5/16 inch
Drilling Capacity
Licensed under Burke
Universal Motor Patent.

Equipped with Motor for operating on Direct or Alternating Current or may be furnished with Motor wound for Direct Current exclusively. 110-220 volts.

The Factory Behind
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Increased Capacity & Efficiency
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Insures Dependable Service Always

Hartford Automotive Parts Co.,

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The *Thomson Method of Spot Welding* is saving many concerns throughout the country from 60 to 90% of what other methods cost them.

The range of Thomson Welding is almost unlimited. We are opening new fields every day.

May we prove to your satisfaction what we can save you?

Send for Bulletin SB.

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Chicago: 817 West Washington Blvd.
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Detroit: English & Miller Machinery Co.
Grand Rapids: McMullen Machinery Co.

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Kansas City: English Tool & Supply Co.
Lynn: 161 Pleasant St.
New York: 1604 U. S. Express Bldg.

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Allied Machinery Company d'Italia, Turin, Italy.
Allied Machinery Company de Espana, Barcelona, Spain.
Allied Machinery Company, Ltd., London, England.
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The *Thomson Method of Butt Welding* has been in use for over twenty-five years. Many of the first machines made are still performing at an immense saving for the owner.

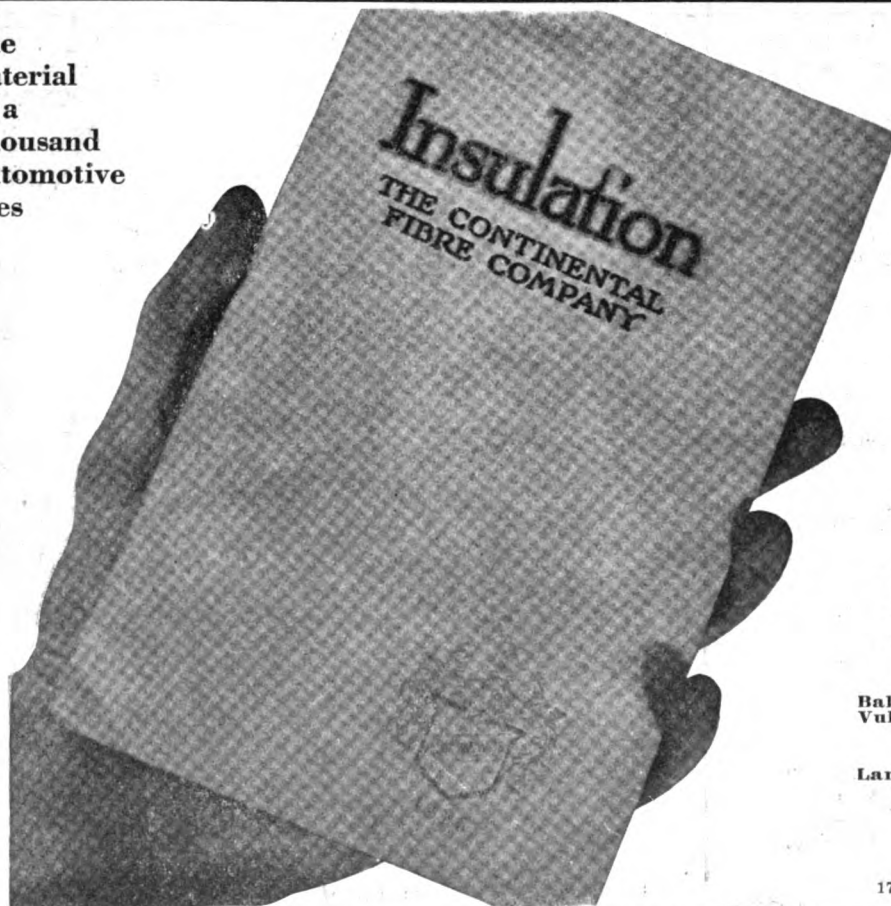
Of course Thomson Butt Welders during all this time have been continually improved—so that now their accomplishments are almost unbelievable.

Send for Bulletin BB.

Thomson Electric Welding Co.

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Pittsburgh: J. S. Miller Machinery Co.
San Francisco: Charles A. Dowd Sales Co.
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It may indicate an improvement in service or a saving in cost of production.

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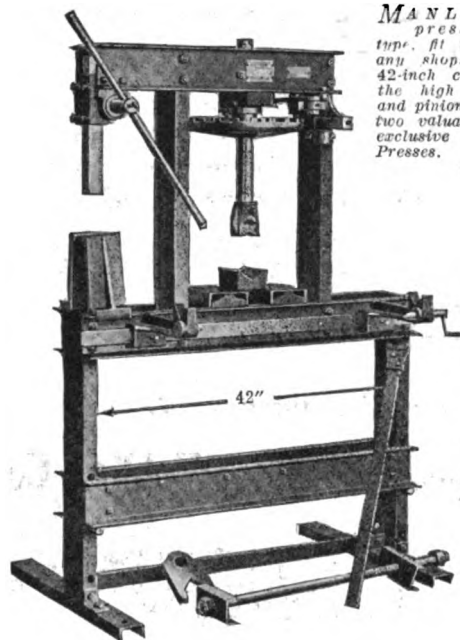
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Bakelite-Dilecto, Continental-Bakelite, Vulcanized Fibre in Sheets, Rods, Tubes and Special Shapes.

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MANLEY 22-ton presses, screw type, fit the needs of any shop. Note the 42-inch clearance and the high speed rack and pinion attachment; two valuable features, exclusive to Manley Presses.

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EQUIPMENT

MANY a good car is blamed for faults that in truth belong to the careless repair work of some "sledgehammer mechanic."

The chief cause of poor workmanship is lack of suitable repair shop equipment.

The Manley Press—developed especially for auto repair work—insures better workmanship by virtue of its unusual range, capacity and adaptability, features that are unequalled in any other press.

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The full Manley line constitutes an efficiency corps always guarding your car against the poor repairing that will surely give it a bad name.

Let us help you to encourage all service stations to do better work. Write for the Manley catalog and see how we can help you safeguard your product.

The Manley Manufacturing Co.
York, Pa.

*WE also manufacture Cranes,
Portable Benches, Wrecking
Cranes, Oil Services, Bench Motor
Supports.*

Manley
Garage Equipment
MADE IN YORK PA.

Le Roi the Little Giant of a Motor




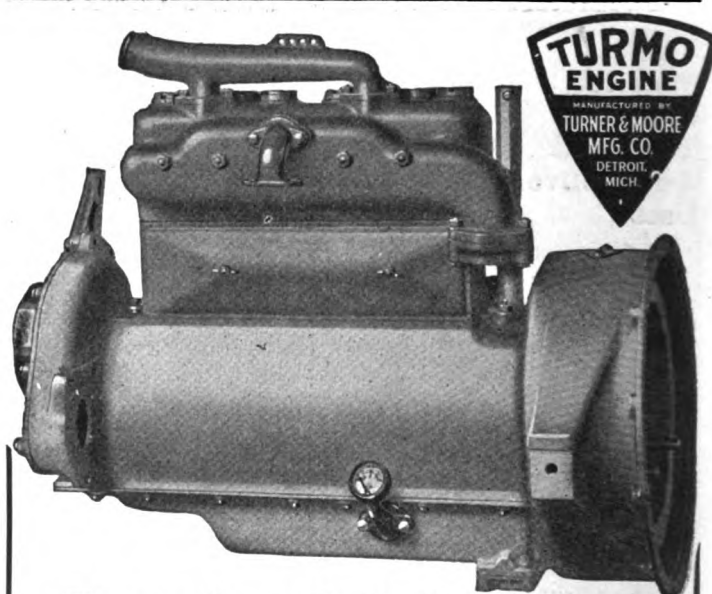
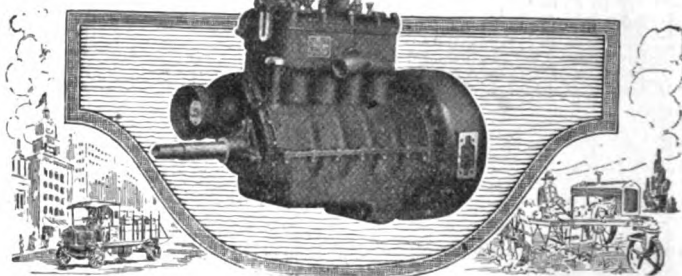
¶ There isn't a rough spot in a Le Roi Motor. Every part has been refined, balanced and finished to the finest degree that engineering skill can devise.

¶ This accounts for the smooth, strong pulse of power the Le Roi motor provides for every machine on which it is equipped.

¶ The wide variety of uses in which the Le Roi is proving satisfactory is an indication that manufacturers not yet Le Roi-equipped should investigate.

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ENGINE**
MANUFACTURED BY
**TURNER & MOORE
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Two Sizes: 3 in. x 5 in. and 3½ in. x 5 in.

Full pressure gear pump lubrication through hollow crankshaft to all bearings.

Highly efficient dry gas hot spot manifold.

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S. A. E. STANDARD MOUNTINGS FOR ALL
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We do *not* make stampings but we can tell you who does and—better still—we can give you the names of just the firms best fitted by experience and equipment to do exactly the thing you need.

Ask us—but don't forget to include a sketch and description of the article or parts



1857
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1920
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You will find no fragile glass cylinder in a Wickes. There are no ventilating fans, series of belts, it's a simple machine.

One of the outstanding features is the self-cleaning, long-lived and unbreakable cylinder. It consists of open grill work of spirally disposed wires, through which heat easily passes off.

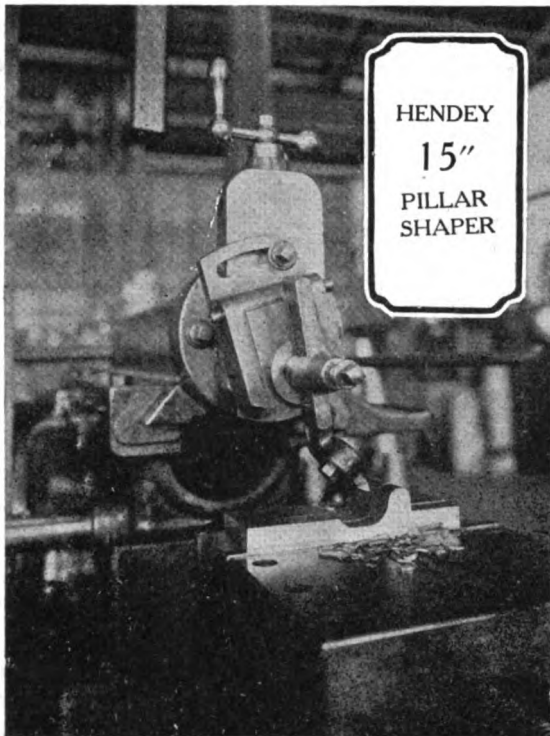
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1920

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The Power Behind the Ram

OF A Henvey Pillar Shaper is not alone contained in belt power, but in such features as exceptionally wide driving belts which act as an elastic cushion in absorbing the shock of the reversing ram travel, stroke of ram is fully adjustable while in motion; the patent friction clutch maintains uniform cutting speed and power the entire length of the stroke.

You as a buyer of machine tool equipment, should not only know the facts concerning Henvey shapers, but should have in your desk file the latest catalogs and information which we shall be glad to send at your request.

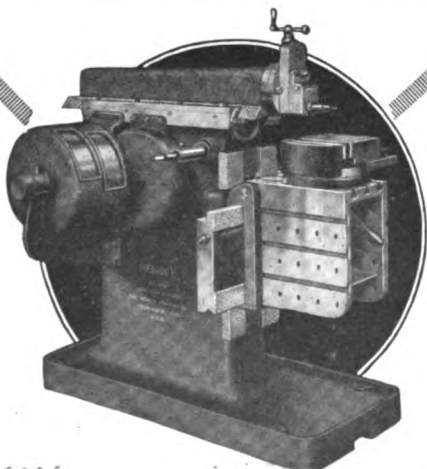
The Henvey Machine Co.

TORRINGTON, CONN.

Singer Bldg., New York City; C. of C. Bldg., Rochester, N. Y.; Oliver Bldg., Boston, Mass.; 618 Washington Blvd., Chicago, Ill.

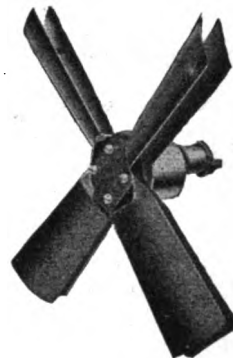
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The Hurricane Under the Hood



High velocity air movement through the radiator. Extreme light weight coupled with unusual strength and rigidity.

Let us know your requirements for passenger cars, trucks or tractors.

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Thirty-seven years of successful business, fifteen acres of floor space, a strictly modern equipped plant, an organization of specializing experts are a few reasons why it will be to your advantage to let us furnish estimates from your blueprints.

Our name plate has always stood for quality, integrity and highly developed workmanship. We mean to live up to that reputation.

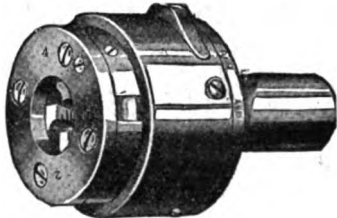
GEUDER, PAESCHKE & FREY CO.
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G.P.&F.SERVICE
"KNOWING HOW SINCE '81"

H&G**Screw Machine Products**

Perhaps you buy your screw machine products outside. In that event, we would like to let you know what we can do. Our low manufacturing costs enable us to make attractive quotations. Prices submitted on blue prints or samples.

We operate one of the six largest screw shops in the country. To increase the production and the quality of our own work we built the H & G Die Head. The manufacture of this die head is now the most important branch of our industry, so you can rest assured it is a good one.



We believe it is the best self-opening die head on the market and if you will write us for details we will tell you of our shop test plan.

**H & G Works—The Eastern
Machine Screw Corp.**

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Light, Safe and Easy to Move

Curtis I-Beam Cranes are preferred in many leading industrial plants for their safety and ease of operation. They are quickly erected at small cost.

Equipped with Hyatt Bearings throughout. Made in various types, hand and pneumatic, in capacities up to 20,000 pounds and in spans up to 40 feet. All parts are extra strong, without excess weight.

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Data Sheet

- Name of Company.....
Address.....
Official or Department for whose attention Production Estimate is to be marked.....
1. Is machine to be belt or motor driven?
 2. If motor driven is the current A. C. or D. C.?
 3. What is the voltage?
 4. Are motors to be furnished by you or by us?
Note—If you are to supply motors send us certified dimension sheets of motors.
 5. If you furnish motors will you send them to us to attach to machine or will you attach them in your own plant?
 6. Will you use air or hand operated chucks?
 7. Is the part machined before it comes to the Thread Miller?
 8. What surfaces do you desire to machine at same chucking as the milling operation?
 9. What is the material?.....Soft?.....Medium?
 10. Is it hard?
 11. How much finish is allowed on milled surface?
 12. Is it true for roundness?
Note—In some cases we can mill from the rough.
 13. How many pieces do you propose to run at one setting of the machine?
 14. Have blue-prints been sent?
 15. Have samples been sent?
- Remarks:.....

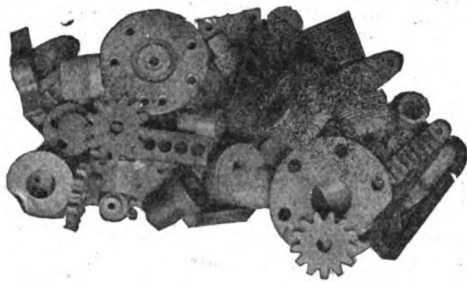
Note—It is understood that this information is submitted to the Smalley General Thread Miller on the part of the inquirer.
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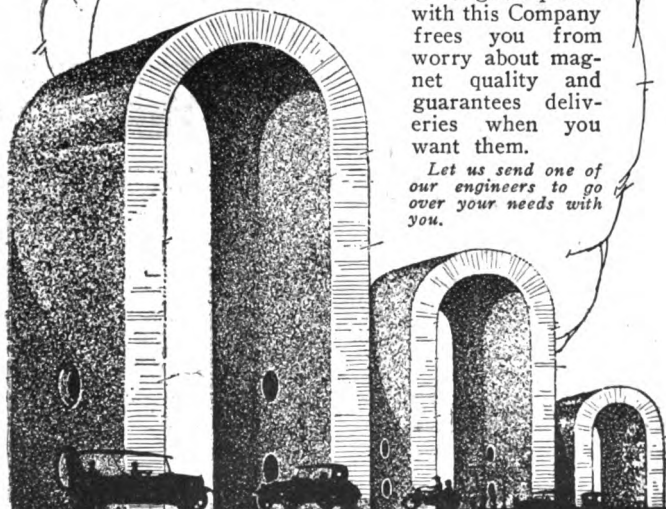
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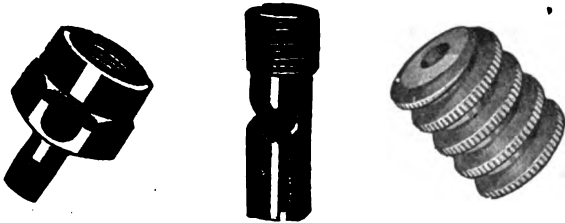
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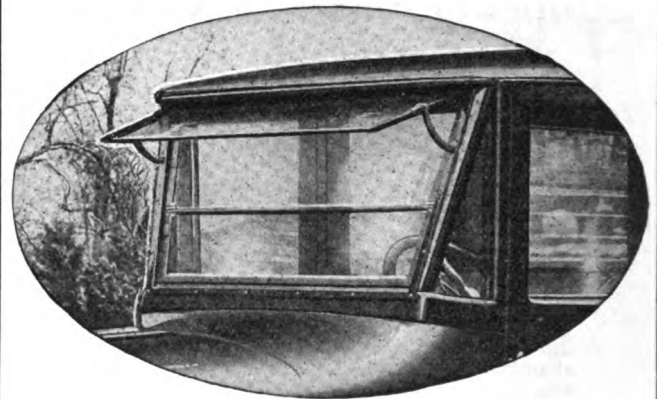
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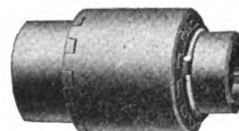
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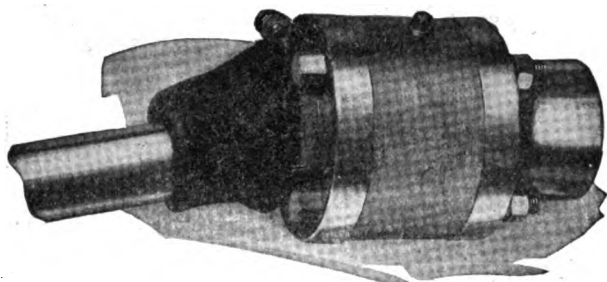
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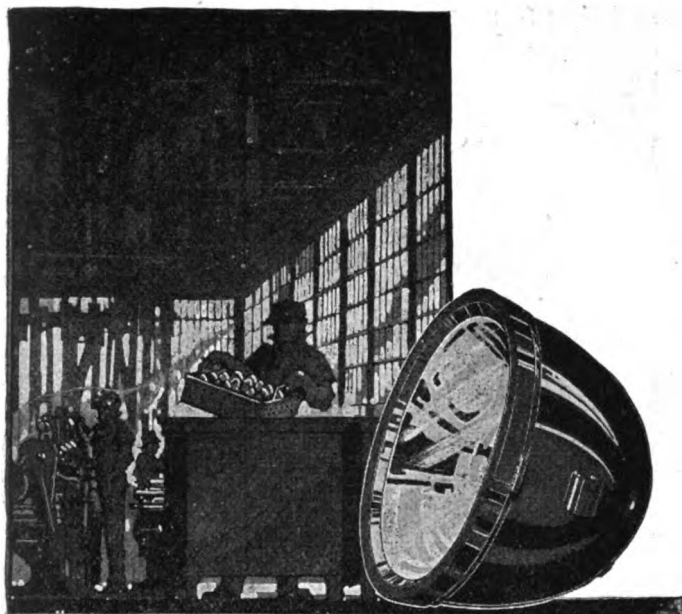
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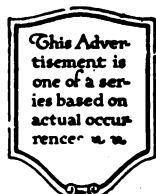


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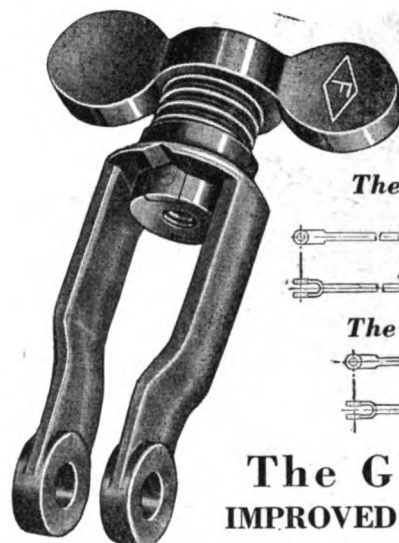
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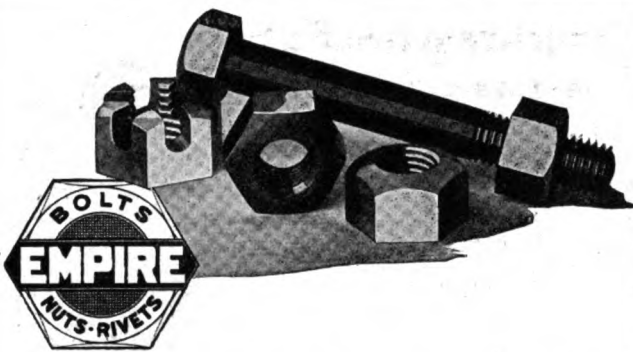
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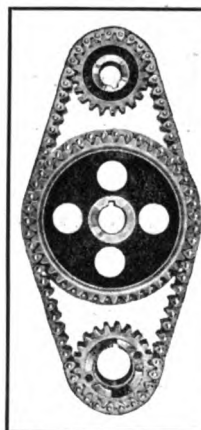
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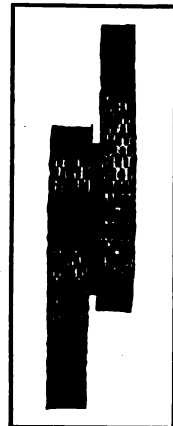
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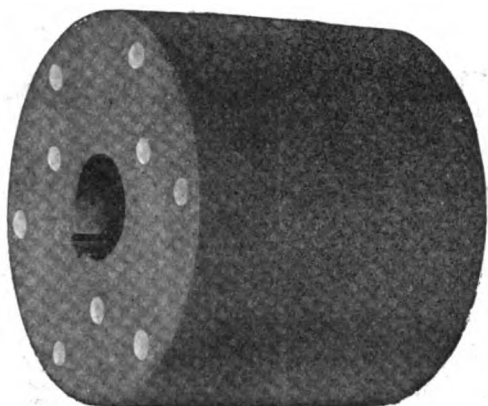
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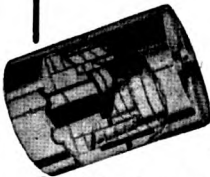
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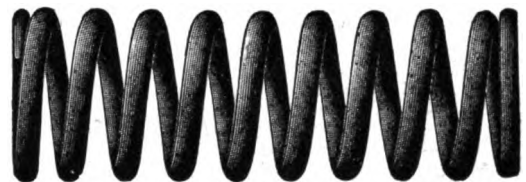
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Superior Equipment**

Detroit Office New York Office Cleveland Office
914 Ford Building 30 Church St. 415 Schofield Building

SOCKET WRENCHES
FOR EVERY
MOTOR NECESSITY

TRUCKS TRACTORS
PASSENGER CARS
GENERAL MECHANICAL SERVICE



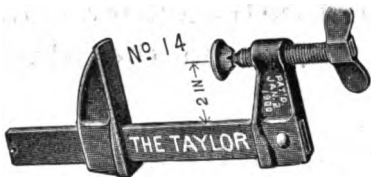
WALDEN-WORCESTER

Incorporated

General Offices and Factory: Worcester, Mass.

CHICAGO NEW YORK SAN FRANCISCO
408 Monadnock Bldg. 295 Broadway 487 Monadnock Bldg.

Write for Catalog No. 400



IF your workmen do not use Taylor clamps, it will save their time and your money to introduce them at once.

Where efficiency counts and results are watched Taylor clamps have become the standard. Let us tell you the experience of those who know.

Catalogue shows 32 styles.

James L. Taylor Mfg. Co., Poughkeepsie, N.Y.

Auto-Lite

*Starting
Lighting
& Ignition*

Electric Auto-Lite Corporation

Head Office and Factory
Toledo, Ohio

Detroit Sales Office
1507 Kresge Bldg.



Time and Temper Savers

The New Efficiency Pipe Wrench. Adjusts automatically; one-hand wrench; positive grip; dependable under all conditions.

Efficiency Lathes protect men, machines, work. No set screws. The harder the pull, the tighter the grip. Both high grade devices.

Write for circulars and price list.



Efficiency Device Corp.

Eighth Street
LONG ISLAND CITY, NEW YORK



NEW YORK.
30 Church St.

Specify
Champion Forgings
THE CHAMPION MACHINE &
FORGING CO.

Cleveland

PHILADELPHIA,
Bourse Bldg.

Ohio
DETROIT,
56 Cadillac Square

CHAMPION FORGINGS

Waukesha
TRADE MARK
High Torque Motors.

(Maximum Pull at Usable Speed)

As a result of the high torque principle, embodied in their construction, Waukesha Motors are decidedly individual in their performance as well as in their economy of operation.

WAUKESHA MOTOR CO.
WAUKESHA, WIS.

Accurate
INTEGRAL CAM SHAFTS

Built By **MUSKEGON MOTOR SPECIALTIES CO.**
MUSKEGON, MICHIGAN.

By Reputation - "The Best Cam Shafts Made"

ENSIGN FUEL CONVERTERS BURN KEROSENE

Ensign Carburetor Co., Los Angeles, Calif.
Chicago Office—2900 Michigan Ave.

SULPHO The Modern High-Speed Cutting Lubricant

We maintain that Sulpho will increase production to maximum speed of machines—and effect a large tool saving. Let us send you a Drum Strictly on Approval.

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111 N. Market Street

Chicago, Ill.

LANDIS

GRINDING MACHINES BORING MACHINES

See our advertisement in first and third issues of month.

LANDIS TOOL COMPANY,

Waynesboro, Pa.

New York—50 Church St.

GRAPHITE AND BRONZE

"BOUND BROOK" is the registered trade mark of a genuine graphite-and-bronze Oil-less Bushing.

It represents the final word in the manufacture of neglect-proof bushings, the consummation of nearly 40 years' progressive experience. We also manufacture "Nigrum" (impregnated hard-wood) Oil-less Bushings.

All Genuine Graphited Oil-less Bushings have always been made at

BOUND BROOK OIL-LESS BEARING CO.

Specialists in the manufacture of Oil-less Bushings for more than a third of a century.

Bound Brook,

Detroit Office: 1723 Ford Bldg.

New Jersey

G&O Radiators

For Trucks, Passenger Cars, Airplanes and Tractors

THE G & O MFG. CO., New Haven, Conn.

The Most Satisfactory Counterbore on the Market



This tool increases production 15% to 50% wherever used. It cuts tool costs to the quick. Three-fourths of it lasts indefinitely—the only wearable part is the cutter, which can be re-ground again and again. Send for descriptive literature today.

COST-CUT COUNTERBORE CO., Inc.,
74 Fort St. East Detroit, Mich.

QUEEN Ins. Co. OF AMERICA

HEAD OFFICE

84 WILLIAM ST.

NEW YORK

VICTOR POLICY

It is a policy of the VICTOR SCREW WORKS to anticipate costly delivery delays and render to our ever growing clientele the usual VICTOR SERVICE.

Victor Screw Works

Detroit, Mich.

LET US BE YOUR TOOLMAKERS

We specialize in service on complete tooling jobs—the one method to greatest efficiency.

Our twice-a-month messages will give you accurate data on economy with efficiency in tool building, from the manufacturer's viewpoint.

Watch for them. Call on us at any time for any service you need.

THE MIAMI TOOL & DIE COMPANY

Ohio

Dayton

MIAMI TOOL & DIE SERVICE



Made in special alloy steels and in different anneals for automotive purposes.

NATIONAL TUBE COMPANY

PITTSBURGH, PA.



Yale Chain Blocks,
Electric Hoists and
Trolley Systems, and
Electric Industrial Trucks, for every service.

Yale Made is Yale Marked

The Yale & Towne Mfg Co. Stamford Conn.



FLEXIBLE without sliding joints.
TIGHT without packing.

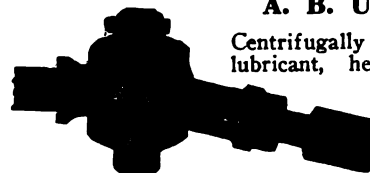
Write for literature and submit specifications for your metal tubing requirements on automobiles, trucks and tractors.

TITEFLEX METAL HOSE CORPORATION

Badger Ave. & Runyon St.

Newark, N. J.

A. B. UNIVERSAL JOINT



Centrifugally forced lubrication, oil lubricant, hermetically sealed within housing. Frequent attention unnecessary.

EASTON MACHINE CO.
South Easton, Mass.

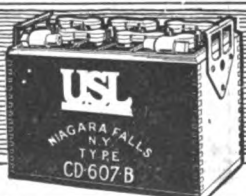


The American Gauge Co.
DAYTON, OHIO

American Amplifying Gauge

The American Amplifying Gauge will lead you to short cuts in gauging that give greater efficiency. Full information on request.

USL storage
batteries
machine-pasted plates



**ROBERTS &
MONROE Inc.**
35 WARREN ST.
NEW YORK CITY



**ROMON
AUTOMATIC
CHASSIS
LUBRICATOR**

The Crescent Metal Part Washing Machine

Cleans Metal Parts of All Shapes and Sizes

CRESCENT WASHING MACHINE COMPANY

85 Beechwood Ave., New Rochelle, N. Y.

WE OFFER THESE FACTORS OF SAFETY

Consider Them As They Apply To Your Production:

- 16 Years of experience.
- Abundant active and reserve capital.
- Unusual organization and mechanical equipment.
- Reserve machines, spacious storage, and extensive reserves of steel.
- Broad and liberal sales policies.

These assure you a steady, unfailing supply of motor car springs.
DETROIT STEEL PRODUCTS CO. Detroit, Michigan, U. S. A.

STAMPINGS

FOR AUTOMOBILES AND TRACTORS

A complete plant fully equipped

MCDOWELL MANUFACTURING COMPANY

PITTSBURG, PA. MILLVALE STA.

GYROTORY—

PITTSBURGH, PA.

FLEXITE

Trade Mark Registered

PATENTED HEAVY DUTY UNIVERSAL JOINTS FOR PROPELLER SHAFTS FOR TRUCKS

PATENTED MEDIUM DUTY UNIVERSAL JOINTS and Propeller Shafts for Passenger Cars and Light Trucks.

Flexite Standard Magneto and Generator Couplings
Slocum, Avram & Slocum Laboratories, Inc.,
Newark, N. J.

Milwaukee
Patterns

Accurate, clean-drawing, sturdy, to withstand the abuse of high speed production. Sold on the service they perform, performing in a way to improve the service you give your customers. Write us.

MILWAUKEE PATTERN & MFG. CO.

1195-99 Thirtieth St.

Milwaukee, Wis.

THE COWAN TRANSVEYOR (LIFT TRUCK SYSTEM)

The Transveyor System Revolutionized Factory Transportation

COWAN TRUCK CO.
5 WATER ST. HOLYOKE, MASS.

Cashman Adjustable Reamers

Outlast 15 solid reamers before replacing set of blades.

CASHMAN TOOL COMPANY, WAYNESBORO PA.

NATIONAL
DRY KILNS

SEASONED LUMBER

Rapidly, Efficiently, Uniformly Produced.

The National Dry Kiln Co.
1136 E. Maryland Street
Indianapolis, Ind.

SUN OILS

Sun Emulso
Sun Automatic Cutting Oil
Sun Pipe Threading Oil
Sun Grinding Oil

Watch for our full page "ad" every second week of each month

SUN COMPANY
PHILADELPHIA



Forces grease to the bearing surface under high pressure—500 lbs. to the sq. in. if necessary. Easily installed on any car, truck or tractor. Write for details.

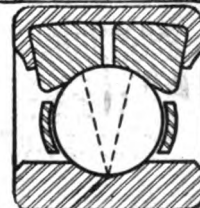
THE BASSICK MFG. CO.
361 W. Superior St.
CHICAGO, U.S.A.

ALEMITE
HIGH PRESSURE
Lubricating System

The Bassick System of Lubrication is fully patented U.S. Patents

Schatz
UNIVERSAL
Annular
BALL BEARINGS

FEDERAL BEARINGS CO., INC.
Poughkeepsie, N. Y.



LYONS STORAGE BATTERY

The Battery Monarch

Lyons Storage Battery Co., Stephen Girard Bldg., Phila., Pa.

THE
ACME
MACHINE TOOL CO.
CINCINNATI OHIO
U.S.A.

RELIABLE, ACCURATE AND EFFICIENT

Embodying numerous valuable time and labor saving exclusive features.

Cincinnati Acme Flat Turret Lathes
Cincinnati Acme Screw Machines
Cincinnati Acme Turret Lathes

Solve your precision and production problems.

THE ATLAS BOLT AND SCREW CO.
Cleveland, U.S.A.



PRESSED STEEL FRAMES
Rear Axle Housings—Drop Forgings
Heavy Stampings
A. O. SMITH CORPORATION
MILWAUKEE

Use National 2-Way, Rapid Production, Full Automatic Boring and Tapping Machines and thereby increase your production more than 100%.

Write for Specifications and Full Information
The National Lathe Co., Cincinnati, Ohio

A Complete Service Which Appeals to the Manufacturer

M O L T R U P

Finished Steel Products

Cold Drawn Steel, Shafting, Free Cutting Screw Stock, Rounds, Hexagons, Squares, Flats, Special Shapes, Finished Machine Keys, Standard Woodruff Keys, Flattened, Ground and Polished Steel Plates, Discs, Foundry Pattern Plates, Steel Core Plates.

MOLTRUP STEEL PRODUCTS COMPANY
Beaver Falls, Pa. New York Office, Woolworth Bldg.

Detroit Steel Casting Company

Detroit, Michigan

Bronze-Back Bearings

For Automobiles, Tractors, Trucks and All
Automotive Equipment

STEWART MANUFACTURING CORP.

4500 Fullerton Ave.

Chicago

POWELL MUFFLERS

Standard Equipment on More Than 45
Leading Makes of Cars, Trucks and Tractors
POWELL MUFFLER CO. Utica, N. Y.

American Chain Company, Inc.

Bridgeport  Connecticut

*Largest Chain Manufacturers of the
World*

DETROIT POWER DRIVEN PUMPS

We are specialists in tire pump manufacture. Our range covers from the small power pump for 30" x 3" tires up to the two-cylinder truck model for tires 44" x 10".

DETROIT ACCESSORIES CORP.
DETROIT, U. S. A.

Chicago Branch: MILLER CAVE CORP., 122 So. Michigan Ave.



FOR TRUCKS

MODERN

Self-Opening Die Heads "Magic" Chucks
Plain Grinding Machines
—For precision work in manufacturing. Send for complete technical bulletins.

MODERN TOOL CO., ERIE, PA.
State and Second Sts.



The PERFECT WINDOW REGULATOR

use them on all of the windows

Standard equipment on exclusive American and European Cars. Write for booklet containing working drawings of device.

The Perfect Window Regulator Co.
20 EXCHANG PLACE, NEW YORK CITY



DIAL GAUGES

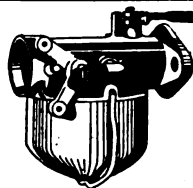
When you find Ames dial gauges in the finest automotive shops, on close limit work—there's a reason. Let us tell you why. Write TODAY.

B. C. AMES COMPANY
Waltham Mass.

BETTER CARBURETION FROM CHEAPER CARBURETORS

Neverfail simplicity enables manufacturers of light cars and trucks to obtain remarkable performance at lower unit cost. We solicit an opportunity to run tests and quote prices on this high-vacuum carburetor.

NEVERFAIL CARBURETOR CO.
192 Jackson Avenue Long Island City, N. Y.



PISTON PINS

For all Makes of Motors
Any Quantity.
Standard—Overhaul—Special

Special steel, correctly heat treated; extremely hard wearing service; close ground size; accurate grinding to close limit; fine surface finishing.

Get our prices and samples.

The Trindl Co., 2917 S. Wabash Ave., Chicago



KELLOGG MANUFACTURING COMPANY, ROCHESTER, N. Y., U. S. A.



ZENITH

"The Carburetor Universal"

ZENITH CARBURETOR CO.

New York DETROIT Chicago
Lyons London Turin

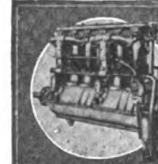
BAKELITE

REG. U. S. PAT. OFF.

The Premier Moulded-Insulation

GENERAL BAKELITE COMPANY

2 RECTOR STREET NEW YORK



The RAUSIC-E-6

STEEL PRODUCTS ENGINEERING CO.

Springfield, Mass.

Most of the best cars of all classes use

MORSE SILENT CHAINS

Refer your cam and accessory drive problems to Morse Engineers.

MORSE CHAIN COMPANY**ITHACA, N. Y.**

Engineering and Sales Office

1703 Woodward Ave

Detroit, Mich.

**DUMORE PORTABLE ELECTRIC
GRINDERS, DRILLS AND FRACTIONAL
HORSE POWER MOTORS**Write for complete information
WISCONSIN ELECTRIC COMPANY
2931 Sixteenth St., Racine, Wis.**Brehm Patented Trimming Dies**

Assure a Clean Edge

A highly specialized production tool adaptable to the punch press. It is not necessary to tie up your lathes for your trimming operation. The Brehm Dies produce a cleaner cut at a decreased labor cost. Write for illustrated circular.

CITY ENGINEERING CO.**Dayton, Ohio****United Alloy Steel Corporation****CANTON, OHIO****BARS—BILLETS—SLABS**

Specialists in Alloy Steels

BRANCH OFFICES

New York
Detroit
SyracuseChicago
Indianapolis
PhiladelphiaSan Francisco
Portland
Cleveland**PARK CRANKSHAFTS
COUNTERBALANCED**

Made by

The Park Drop Forge Company**CLEVELAND, OHIO****The ROCKFORD****HEAVY DUTY HORIZONTAL
BORING AND DRILLING MACHINES**

Tell us your production requirements, and we'll be glad to show you what the Rockford will do for you.

THE ROCKFORD DRILLING MACHINE CO.
Rockford, Ill.

U. S. A.



Unclimbable, rustless and fireproof chain link woven steel fences. Unequalled for durability and protection. See our display advertisements in the first and third issue every month.

Catalog on Request

ANCHOR POST IRON WORKS, 167 Broadway, N. Y.For **KMCO** Does Not
Bearings Crystallize**BRINELL HARDNESS 28.4-30****H. Kramer & Co., 1324-44 W. 21st Place, Chicago****ELECTRIC
STEEL
CASTINGS****The Connecticut Electric Steel Co., Inc.**
Hartford, Conn.**BUSHINGS**
BRASS AND BRONZE

We specialize on this class of work for the automotive industry. All work guaranteed to conform to specifications. Our representative will call.

SUPERIOR BRASS WORKS, 22 Brush St.
Address Dept. 1 Detroit, Michigan

Delivers a highly explosive mixture with extreme economy.

Sundersman Corporation
Newburgh, N. Y.**BUY MIRECO WIPING CLOTH REMNANTS
BY THE BALE AND SAVE MONEY**

These new, clean cloths are put up in bales for your convenience. Let your workman use them for all wiping and polishing jobs. Also in the place of towels. They will save you money. Mireco Cloths are carefully selected Cheese Cloth, Flannel, Towelings, Blanket Ends, etc., from the largest cloth mills, cut in convenient lengths and packed in bales ready for use. Write for samples and price to choose from.

MILL REMNANTS CO.

19 Bond Street

New York City

IN PLANNING A CAMPAIGN, does an advertiser guess at the quality of the art work?

Does he guess whether the copy to be used is a true representation of his goods?

Does he guess at the charges of the photo-engraver and electrotypist?

Then why guess at the circulation of the publications to be used, how that circulation is obtained, where the papers go, how many paid for, how many given away and how many subscribers in arrears?

These points are vital to the success of the campaign.

It is not necessary to guess. Any publication that is worthy of the advertiser's consideration will give him complete data verified by the Audit Bureau of Circulations.

Ask for the A. B. C. report on **AUTOMOTIVE INDUSTRIES**.**FRANKLIN
DIE-CASTINGS**

Accurate die-castings made from Aluminum, Tin, Lead and Zinc base alloys. Estimates given from samples, drawings or blue prints.

Franklin Die-Casting Corporation, Syracuse, N. Y.**Everdry****Motor
Fabrics**Made by
BOSTON WOVEN HOSE & RUBBER CO.
Makers of Rubberized Fabrics for 40 Years**Alloy Steel in Stock****S.A.E. Specifications****JOSEPH T. RYERSON & SON**

CHICAGO

ST. LOUIS

DETROIT

BUFFALO

NEW YORK

Use Acklin Stampings Instead of Heavy Forgings and Castings

Production costs can be greatly reduced by using pressed metal parts instead of forgings and castings. We will gladly send the Acklin Service Man to estimate on the pressed steel parts of your car, truck or tractor.

THE ACKLIN STAMPING COMPANY
Toledo

Ohio

BROWN-LIPE GEAR CO.
Transmissions
BROWN-LIPE CHAPIN CO.
Differentials
Both at Syracuse, N. Y.

Confidential Markings for Testing and Inspecting

Pittsburgh confidential marking symbols are in use by the largest manufacturing concerns who require symbols known only to themselves for inspecting and testing. They can always be depended upon to make a clear, permanent impression and their life is unlimited.

Let us send you our descriptive catalogs.

PITTSBURGH STAMP CO., INC.

Makers of Marking devices.
314 Penn. Ave.,

Established 1913.
Pittsburgh, Pa.

DAHLSTROM METALLIC DOOR CO.

Jamestown, N. Y.

Metal Mouldings and Shapes

New York: 130 E. 15th Street; 2 Rector Street
Detroit: 855 Book Building Chicago: 19 South LaSalle St. Cleveland: 916 Sweetland Bldg. St. Louis: 106 North 3rd St.
BRANCHES IN ALL PRINCIPAL CITIES

Weidely Bulldog Motors

Bore, 4 in. and 3 1/4 in.; Stroke, 5 1/4 in.; Piston Displacement, 276 and 343 cu. in.; Crankshaft Main Bearing (Rear), 3 1/4 in.; (Front or Center), 3 1/4 in.; Connecting Rod Bearing, 3 1/4 in.; Wrist Pin Bearing, 1 in.; Diameter of Valves in Clear, 1 13/16 in.; Weight, 700 lbs.; Horse Power (S.A.E.), 27.6 and 22.5; Suspension, 3 point; Ball Housing No. 3 S.A.E. Spread of Arms, 24 1/2 in.; Generator with Distributor or Magneto and Starting Motor; Governor; Our own built-in type can be furnished.

Weidely Motors Co., Indianapolis, Ind., U. S. A.

San Francisco—F. Leroy Hill, 96 Ninth St.
New York—John M. Steinar, 2 Columbus Circle

JOHNSON BRONZE BUSHINGS

Over twenty years of specialization have convinced manufacturers that the uniformity, permanence, dependability and quality required are always to be found in JOHNSON BRONZE BUSHINGS.

Send us your blue prints or sample for quotations.

JOHNSON BRONZE COMPANY

Works and General Offices: New Castle, Penna.

OHIO TILTED ROTARY MILLING MACHINE

Look back to last week's issue and forward for next week's full page ads showing this famous machine in action.

THE OESTERLEIN MACHINE CO. Cincinnati, Ohio

OBERTING MOTOR



Four cylinder passenger model—also adaptable for light truck and tractor operation. A model of simplicity, strength and refinement. Can be taken down and set up in less than two hours. Crankshaft bearings exposed in ten minutes. Unusually efficient oiling system. Other radical improvements. Let us send details and specifications.

THE OBERTING MOTOR CO.

Cleveland, Ohio

Automobile Gears

Cuts Gears for Automobiles, Trucks and Tractors.

Quality — Quantity — Quickness

New Process Gear Corporation
Syracuse N. Y.

THE KELLY REAMER CO.

A tool-room that gives prompt engineering service and deliveries on all kinds of special boring and reaming Production Tools. Catalog on request.

CLEVELAND

OHIO

FIBER PARTS All Shapes—All Sizes

We can supply you with fiber parts of good quality in odd shapes, washers, discs, bushings, gear blanks, smooth sawed blocks or any special shape you may use. Send sketch or sample and let us quote you prices.

RUSSELL SPECIALTY MFG. CO.
2944 W. Lake St. Chicago



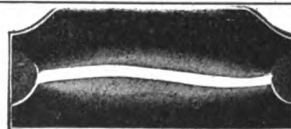
One man with the magazine feed
Reynolds Screw Driving Machine

can drive 800 to 2000 screws per hour—just as fast as he can get the work on the table. Write for information—write today.

THE REYNOLDS MACHINE CO.
Dept. "G," Massillon, Ohio



BANTAM, CORP. U.S.A.



the white hot spark you want,
when you want it—and every time!

THE EISEMANN MAGNETO CORPORATION
Detroit BROOKLYN Chicago



©1920
T. E. M. C.

DROP FORGINGS OF ALL DESCRIPTIONS

If you are looking for service—try us

ENDICOTT FORGING & MFG. CO.
ENDICOTT NEW YORK

300,000 STANDARDIZED BOSTON GEARS IN STOCK

1200 SIZES SEND FOR 1920 CATALOG

BOSTON GEAR WORKS NORFOLK DOWNS
QUINCY, MASS.
CHICAGO BRANCH, 623-25 W. WASHINGTON BLVD.

VARNISH DRYROOMS

Scientifically Built—Automatically Controlled

MAKE EVERY DAY A PERFECT DRYING DAY

DRYING SYSTEMS, Inc., 11-17 South Desplaines Street, Chicago
Users protected by Grosvenor Process Patent 1,186,477**JOSEPH A. ANGLADA, Consulting Engineer**DEVELOPMENT :: DESIGN :: RESEARCH :: CONSTRUCTION :: REPORTS
Parts and Complete Vehicles of All Types

Our experience and facilities enable you to obtain maximum results at the minimum cost. Factory organization and operation

New York, Goodrich Tire Bldg. Chicago, Marquette Bldg.
Philadelphia, Real Estate Trust Bldg.ENGINEERING DRAFTING INVENTIONS COMMERCIALIZED
Write for particulars regarding service and facilities**Van Norman Machine Tool Company****VAN NORMAN**Milling Machines, Internal Grinders
Ball-Raceway Grinders, Bench Lathes, etc.
SPRINGFIELD, MASS., U. S. A.**L. H. BLOOD**

Consulting and Designing Engineer

Standard and Special Machine Tools
Union Central Building
CINCINNATI, OHIO**ANDREW C. SISMAN CO.**
DETROIT

Specialists in wood automobile body building, truck cabs, wooden carcasses for open and closed bodies, truck bodies, motorbus bodies, running boards, floor boards and Linderman machine products.

**Laboratory for testing
Motors and Accessories**

RUTHERFORD, N. J.

JOSEPH TRACY, Office, 1780 Broadway, N. Y.

Quality and Deliveries Guaranteed

**IRON CITY
SPRINGS**Iron City Spring Co. Pittsburgh, Pa.
Factory Representative, Thomas J. Wetzel, New York—Detroit**CONDON COMPANY**T. L. CONDON - C. L. POST - A. M. WOLF
ENGINEERSDesigners of Industrial Buildings
Industrial - Architectural - Structural - Mechanical - Electrical
1435 MONADNOCK BLDG. CHICAGO, ILL.
PHONE HARRISON 66**BUICK**When better automobiles are built
Buick will build them**L O C K E
P A T T E R N W O R K S**

"Largest Automotive Pattern Shop in the World"

33 Woodward Ave.

Detroit

**Factory and Machine Shop
Equipment**

Special Tools for Every Production Process

See our advertisement in Automotive Industries of October 21.

THE FAIRBANKS COMPANY
Branches in 23 Principal Cities

Manufacturers of Guaranteed Balancing Apparatus and Special Machinery for the Study and Elimination of

VIBRATIONunder the personal management of
MR. N. W. AKIMOFF, Pres. and Mgr.**VIBRATION SPECIALTY CO.**

Mr. Akimoff's initials NWA our trademark.

Harrison Bldg.

Philadelphia, U. S. A.

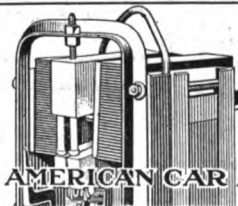
Cable Address
"Millhollco"**TURRET**New York Office
111 Broadway**MILLHOLLAND**

We manufacture a complete line of Screw Machines and Turret Lathes. Our Engineering force is at your service. Write for catalogs.

Millholland Machine Co.

LATHES

Indianapolis, Ind., U.S.A.

**BERWICK
ELECTRIC
RIVET HEATER**

Hot rivets in thirty seconds. Prevents burning and scaling. No smoke. Safe. Low operating cost. Send for catalogue.

AMERICAN CAR AND FOUNDRY COMPANY
165 BROADWAY, NEW YORK**SINCLAIR
OILS**SINCLAIR
REFINING CO
CHICAGO**CANDLER**Radiators, Stampings and Sheet Metal Parts
Candler Radiator Co.
485 Shoemaker Road
DETROIT

CONTRACT WORK

LATEST PRODUCTION EQUIPMENT FOR FABRICATION OF

Parts or Complete Units, Aeroplane Parts, Experimental Motors, Aeronautical or Automotive. Testing Equipment, General Machine Construction

AND MANUFACTURE OF PARTS IN QUANTITIES

Automatic and hand screw machine capacity to 4¼" diam. Lathes to 36" swing. Bullard vertical and Lucas horizontal boring mills, vertical and horizontal millers, multiple high power and sensitive drills. Grinding, gear cutting, thread milling, gun drilling, broaching, stamping, heat-treating, pyrometer equipment, full testing equipment, also pattern and wood-working shop, sheet metal and forge shop. Engineering where desired.

Submit your mechanical problems to

BREWSTER & CO., Inc.

Bridge Plaza, LONG ISLAND CITY, N. Y.

PRODUCTION WORK

WRIST PINS, PISTONS, BUSHINGS,
GEARS, STAMPINGS, ETC.

Vulcan Auto Parts Co.

2125-25-30 Race St., PHILADELPHIA, PA.

AUTOMATIC SCREW MACHINE

Size ¼ to 2½ PRODUCTS

Toledo Automotive Product Co.
2240 SNEAD AVE. TOLEDO, OHIO

Prompt deliveries on

Dies Tools Jigs

"I want what I want when I want it," said the manufacturer. "and the Atcheson people have never fallen down on a job yet." If it's a rush job—a fussy job, or any kind of a job for Tools, Dies, Jigs and special machinery—the Atcheson people will get it out on time—and it will be right. Consultation will incur no obligation.



ATCHESON TOOL & DIE COMPANY
COLUMBUS 600-11 North Fourth Street OHIO

IMMEDIATE DELIVERY

Screw Machine Products

AND
Machine Work
OF ALL KIND

Marion Screw and Machine Co.
17 North 5th St. PHILADELPHIA, PA.

METAL STAMPINGS

AUTOMOBILES—MOTORCYCLES—BICYCLES. PRESSED STEEL SOCKET WRENCHES.

New England Pressed Steel Co.
NATICK, MASS.

Sheet Metal Work

OF ALL KINDS
STEEL COMMERCIAL BODIES AND TRAILERS
A SPECIALTY

Let us quote you Prompt Deliveries
F. SPINDEL & CO.
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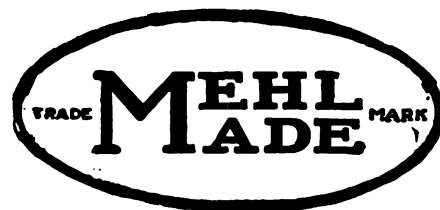
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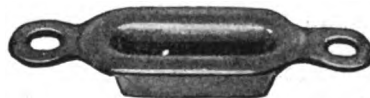
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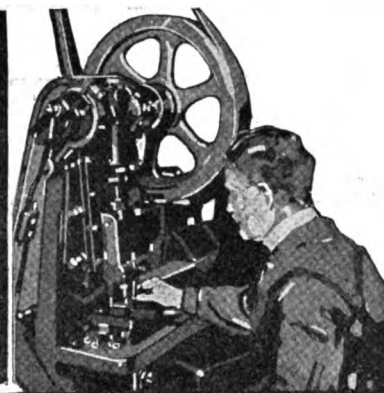
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The items appearing in these columns form a part of the inquiries received by our Contract Work Service Department during the past three weeks. Manufacturers or concerns interested in these or similar inquiries can secure full information as to how this service is operated by communicating with the Contract Work Service Department, Automotive Industries, 239 W. 39th Street, New York.

6784 A foreign correspondent manufacturing high class motor bodies and owning general assembly work, situated near London, England, would like to get in touch with concerns offering agencies or rights for United Kingdom in good selling lines, chassis, accessories, or components or agricultural machine, etc.

6785 Would like to take on the representation for export of a popular priced car. The inquirer states that since a great many of the older established factories are already represented, it may be necessary to refer to younger plants.

6786 This correspondent located in Calcutta, India, would like to get in touch with manufacturers or jobbers of automobiles or automobile equipment, who desire to establish trade relations with India and the East.

6787 Has recently patented a fuel heating or vaporizing attachment for automobiles of the L-head type and for the Ford motor in particular. The device is claimed to be simple in construction and could be put on the market at little expense. Would like to dispose of invention on a royalty basis or will consider other arrangements.

6788 Wishes to get in touch with concerns who are equipped to handle and quote on dies, gear cutting, metal stampings, screw machine work, coil springs.

6789 Would like to communicate with concerns who are equipped to handle and quote on malleable iron, grey and steel castings, gear cutting, grinding, lathe and milling machine work, metal stamping, wood and metal patterns, punch press work, screw machine and sheet metal work, coil springs, tool and die work.

6790 A company located in New York State is interested in receiving quotations with a view of sub-letting to outside concerns on malleable castings.

6791 Concern located in Elmira, N. Y., would like to get in touch with concerns who are in a position to quote on and to supply malleable iron castings and plier forgings.

6792 Wants to communicate with concern equipped to handle and quote on commercial and passenger bodies; also fire apparatus and bus bodies, malleable iron castings—brake rod assemblies and windshields.

6793 This company located in the Middle West wishes to get in touch with those who are equipped to handle and quote on malleable agricultural universal joints for $\frac{3}{4}$ " shaft.

6794 Is interested in receiving quotations with a view of sub-letting to outside concerns, contract basis, on small grey iron castings, mild steel forgings (cups, etc.). Screw machine work (small parts); also small flanges similar to magneto couplings.

6795 Corporation located in New York City would like to get in touch with concerns who are equipped to handle and quote on castings (kind not specified). Forgings, machine parts, metal stampings, plating and japanning; also screw machine parts.

6648 Is located in New York City; has invented and patented a new clamp. It has been tested out by various firms with considerable success; seeks manufacturing and marketing co-operation.

6649 Has secured patent in 1919 on a multiple-passage reflector, for an automobile light, and would like to have the device manufactured on a royalty basis or will consider other arrangements.

6650 A mechanical engineer located in Dayton, Ohio, has invented a variable speed transmission that, from an engineer's point of view, is most efficient and economical, wishes to get in touch with concerns or individuals who are financially able to assist in manufacturing and marketing.

6651 A motors company located in the South has developed an automobile tool—a spring leaf spreader, which is especially adapted to Ford cars, having springs running crosswise.

6652 Has invented and patented a coin-controlled gasoline dispensing device that can be made by any concern having a foundry and machine shop. Desires to make royalty basis arrangements or otherwise.

6653 A Western correspondent has recently patented a burglar-proof steering wheel which operates by locking the wheel; wishes to sell through royalty basis arrangements or will consider any fair proposition.

6654 This number relates to new improvements in attachment for automobiles, particularly Fords, for the purpose of extracting tires from mudholes or sand, when stuck. Will make a royalty basis arrangement or otherwise.

6655 An inventor in Madison, Wis., has developed an automobile pump, with the idea of making the task of washing an automobile more easy. This is a suction pump arrangement that is to be applied to left hind-wheel after same has been jacked up. Will consider royalty basis arrangement or otherwise.

6656 Has developed a new traction device for automobiles and trucks to provide safe and sure traction in all mud, sand and snow. Seeks financial co-operation.

6657 A Southern correspondent has invented an improved spark plug; also has patent pending on a new spark intensifier. Seeks financial assistance.

6796 Holds patent rights and wants concern to manufacture on contract a radiator testing tank and work bench with a lowering, raising and revolving platform. Tank of galvanized iron; framework of wood; can be knocked down for shipping; platform made of cast and angle iron.

6797 Is in the export business, representing several concerns of France, Belgium and Spain, and knows of a demand for chassis for voiturettes to be made as per their own drawings (motor not included), would like to get in touch with a firm desiring to build on a fair basis.

6798—This correspondent, located in New York City, is looking for a high grade single cylinder gasoline engine, 2 to 5 horsepower, for isolated lighting plants.

6799 Has invented an auto headlight. The principle of the invention is to stop the glare from where it comes by the aid of scientifically designed glass shades that fit under the bulbs and stop the

blinding rays that are difficult to cope with. Will let out on a royalty basis or consider other arrangements.

6800 This company has a grease retainer that is claimed to have had great success. The article is patented and being manufactured in the far West. Eastern representation and manufacturing co-operation is desired.

6801 Has invented an automatic automobile lock which works without the aid of a key. The lock stops the engine and locks the car simultaneously by the act of pushing a button. Will let out on a royalty basis or otherwise.

6802 Is interested in marketing a 15-20 h.p. railway motor which is a 4 cycle, 2 cylinder, air-cooled motor rating not over 1000 r.p.m., to be compact, light, simple as possible; friction clutch, 2 speed planetary transmission, low gear, direct drive on high without reversing feature. Manufacturing and marketing co-operation desired.

6804 Has a new and improved roller bearing, in which the friction is so completely eliminated that it will run without any lubrication. Manufacturing co-operation is desired.

6805 A Pacific coast correspondent has a patent manifold for internal combustion engine, (patented Nov. 8, 1910) wishes to dispose of device on a royalty basis or will consider other arrangements.

6806 Is the inventor of a quick detachable spark plug for automobiles, (patent applied for) would like to get in touch with some one who will manufacture and market the device on a royalty basis.

6807 Has patented a valve device for rotating the valves of internal combustion engine. Would like to let out on a royalty basis or will consider other arrangements.

6808 Residing in the Middle West, has recently obtained patent on a radiator cap, seeks disposal of invention on a royalty basis or otherwise.

6809 Has invented and secured patent on an automatic graphite lubricator, would like to have the device manufactured on a royalty basis by a reliable firm. Invention has been well tried out.

6810 Oakland, Cal., correspondent has invented a right-of-way signal for automobiles, trucks, etc., which seems to have several interesting features. Inventor seeks manufacturing and marketing co-operation.

6811 Wishes to market either by a royalty basis arrangement or otherwise, two devices he has invented, one an air washer, the other a clutch check, which is developed to prevent clutch from grabbing.

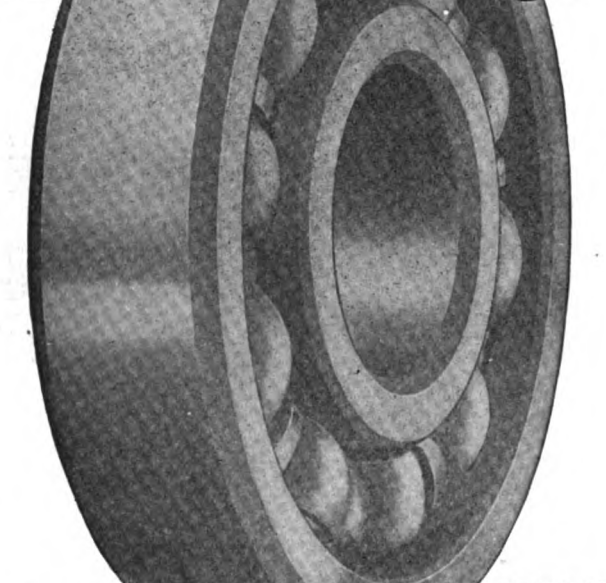
6812 Of San Francisco, Cal., has invented and secured patent on an auto pump support. Will dispose of on a royalty basis or otherwise.

6813 A company in Middle West would like to get in touch with concerns who are equipped to handle gear cutting, lathe and milling machine work, tractor manufacturing, sheet metal work, Transmission manufactured complete, also Worm Drive Rear Axle made up complete, in accordance with specifications.

6814 A Western concern is interested in receiving quotations with a view of subletting to outside concerns, malleable castings.

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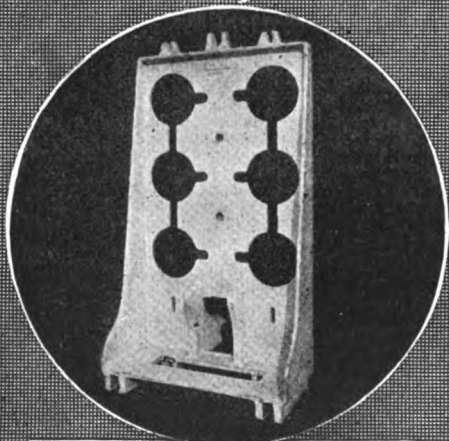


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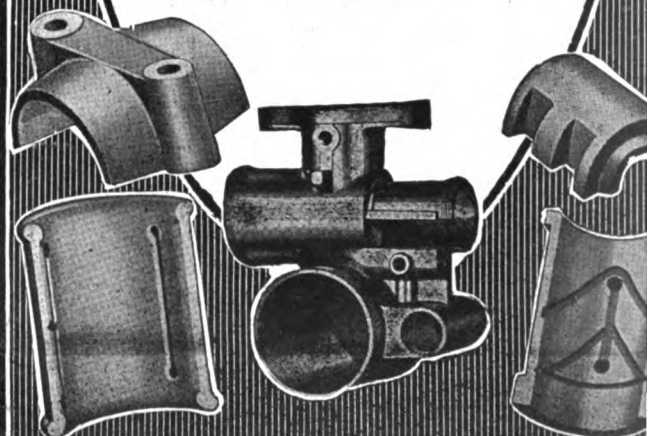
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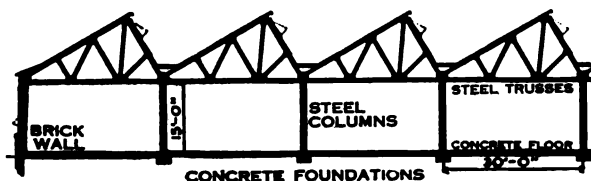
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